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GTE shuns Cobol

Mass. shop reduces applications costs with help of fourth-generation tools

By Edward Warner
CW Staff

DANVERS, Mass. — The applications development strategy at GTE Products Corp.'s Sylvania Lighting Center here can be summed up in two words: No Cobol.

Since mid-1983, Sylvania Lighting's data processing shop has relied exclusively on two fourth-generation applications development tools for its new applications, according to Howard Pearce, systems development manager. Those packages are IBM's Applications Development Facility II, used for on-line programming, and Information General Corp.'s Mark IV, used for programming in batch mode.

The only Cobol programs running in the shop are several older batch processing programs that have not been converted. The only Cobol programming that takes place is for maintenance of those programs, Pearce said.

Can saying good-bye to Cobol lead to success? Sylvania Lighting DP manager John R. Holcraft said he believes it can and pointed to a \$780,000 stock replenishment program that came up in November 1984 at a reported cost of \$8.67 for each of its 80,000 lines of code. The program provides 23 Sylvania Lighting warehouses around the country with inventory replenishment, based on orders they upload daily to the IBM 3033

See COBOL page 8

TWA makes move to VS compiler

By John Sullivan
CW Staff

KANSAS CITY, Mo. — IBM's VS Cobol II may not be a true Cobol-80-compatible compiler, but one early user is already benefiting from the proposed Cobol-80 standards embodied in that product.

Programmers at Trans World Airlines, Inc.'s data center here have not yet begun using VS Cobol II for new development, but they have started migrating a portion of TWA's existing applications base of roughly 10 million lines of Cobol code to the compiler. TWA has been field-testing the compiler for nearly two years as a member of IBM's Early Support Program for VS Cobol II, announced last year [CW, Feb. 2, 1984].

According to Rex Widmer, technical specialist for applications development support, TWA is currently migrating three classes of existing applications to VS Cobol II. That migration process involves recompiling on VS Cobol II and cleaning up any incompatibilities in the compiled code. Those incompatibilities stem from earlier Cobol language standards embodied in the older IBM VS Cobol compiler in use at the data center. The applications initially chosen for the migration effort, he said, are those that can exploit the unique features of VS Cobol II.

The first set of applications being moved are systems involving large data structures. Widmer said IBM's older language products

See TWA page 4



A CLOSER LOOK

Delivery options boosting E-mail

By John Ditz
CW Staff

Publicly available electronic mail services are still in their infancy but are gaining popularity because, paradoxically, of hard-copy delivery options that make their use similar to — if not quicker than — overnight mail services.

Electronic mail has been available for some time as an adjunct application supported by computer time-sharing companies and value-added network carriers. This orientation, however, has typically restricted the sphere of potential electronic mail users to the data processing personnel who actually use the computational and data networking services.

The market entrance of Western Union Corp. and MCI Communications Corp. within the last year changed that. Their services are aimed directly at managers and executives, according to Mark Winther, director of new communications services at Link Resources, Inc., a market research firm in New York.

And although still dominated by the computer time-sharing companies, including ITT Dialcom, Inc.; Source Tele-

See E-MAIL page 10

FCC OKs access charge plan

Decision may pave way for AT&T private-line rate hike

By Bryan Wilkins
CW Washington Bureau

WASHINGTON, D.C. — The Federal Communications Commission has approved the structure of special access tariffs that local telephone companies charge, leaving undecided the amount that private-line users and long-distance carriers will pay for service through telephone company switches. That decision, which could come at any time, would pave the way for implementing the special access tariffs as soon as March 1.

Special access is the type of dedicated connection that local telephone companies will offer to users of private lines and long-distance providers of private-line ser-

vices. Public switched access charges — the counterpart to special access — of \$6 per line per month for businesses have been in effect since last June.

While generally approving the special access rate structure, the FCC ordered the National Exchange Carriers Association to make further adjustments to the sections of the special access tariffs dealing with rate structures. Specifically, the FCC required it to list the numbers and locations of so-called hub offices, where bridging and multiplexing functions are performed, so that customers will be able to compute their rates from the listed tariffs.

"They really won't decide special ac-

See RATES page 6

TOP OF THE NEWS

One day at a time. An increasing number of users are turning to short-term rentals to fill some of their microcomputing needs. But software vendors question the legality of third parties renting out their software, claiming this practice violates license restrictions. Page 2.

San Francisco officials are demanding a computer security investigation after a police lieutenant admitted having access to the city's criminal justice computer system, possibly jeopardizing the disposition of hundreds of criminal cases. Page 5.

Crystal ball gazing. Attendees at InfoCentral: The Information Management Exposition & Conference pondered the future of micro software. Page 13.

Reader said than done. The government has ordered federal agencies to cut software maintenance costs 25% while obtaining a minimum 10% return on computer technology investments. Page 16.

Moneytrail, Inc. unveiled a communications architecture said to interconnect its factory automation products. Page 71.

NEWS

Micro rentals fit bill for temporary needs

By Edward Winner
CW Staff

NEW YORK — When the compensation and benefits department at Trans World Airlines, Inc. (TWA) needed to recalculate the pay rate of all airline employees, one IBM Personal Computer was not enough. To get the job done smoothly and on time, TWA rented a second one.

The airline's action is not unusual, according to several New York personal computer rental agencies. More corporations, they said, are turning to rentals to fill temporary needs. Some, they added, are also using rentals to bypass a purchasing department that has put a lid on personal computer buying or to take advantage of tax benefits.

Most corporations, though, said they rent personal computers to fill temporary business needs. At American Express Co., those needs presented themselves last month in the form of a growing backlog of demand for slides from its business communications department. The department produces slides on an Autographix, Inc. Autographix 200 slide-making system powered by an IBM Personal Computer. To meet demand, producer Marianne Locher said the firm rented another Personal Computer for graphics generation.

Rental contract ends in March

The Autographix 200 still produces the slides, she explained, but when its three-month rental contract is up in March, the extra Personal Computer will have proved its worth. "Why should I buy one?" she asked.

Locher's department rented the Personal Computer from New York's PC Services, Inc., a firm that claims it has an inventory of \$250,000 to \$600,000 worth of personal computers and peripherals. In any given month, according to rental and sales manager Rupal Shah,

\$200,000 worth of that inventory is being rented — almost all of it to businesses.

Shah acknowledged that the price for renting is higher than that for leasing, but he noted that a lease usually runs at least six months while a rental can be for as little as one day. A typical Personal Computer on lease, he said, costs \$100 to \$115 per month. His firm rents them, all without software, for \$300 per month.

Another New York personal computer rental agency, PC Computer Rental Corp., said it rents both personal computers and software (see story below). Its monthly rates for hardware are \$295 for the IBM Personal Computer, \$495 for the Personal Computer XT and \$630 for the Personal Computer AT.

Shah, meanwhile, noted that his firm's clients number among the largest firms in New York, including the NBC and ABC television networks, CBS Records, Western Union Corp. and the Dime Savings Bank of New York.

At Dime Savings, Assistant Controller Mike Piedra explained that the bank turned to renting to get experience with different personal computers prior to making a decision to standardize. "You [can] go down to Computerland and sit down at one of the computers, [but] that's not enough," he said.

There were other factors that led Dime Savings to rent, however. The purchase of micros must be cost-justified with the bank's purchasing department, he said, and "it was easier to [cost-justify] a rental than a purchase."

In addition, a tax benefit accrues to those firms that rent rather than buy and "that helps from our accounting point of view." As Alex Wong, operations manager of PC Computer Rental, put it: "Rental is 100% write-off." Buying, however, gives only a write-off for depreciation: 15% in the first year and roughly 21% during the next four.

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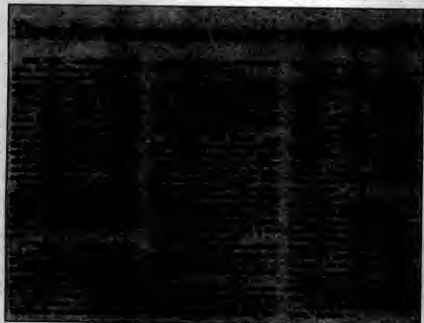
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Amdahl slices prices on 580 CPUs, 6380 drives

SUNNYVALE, Calif. — Amdahl Corp. last week cut prices on its 580 series mainframes and special configurations of 6380 disk subsystems.

A spokesman said purchase prices on the 580 systems were lowered an average of 6% to 12%. For example, a 5880 processor with 64M bytes of main memory and 48 I/O channels now costs \$4.59 million. The system used to cost \$5.04 million.

Amdahl also announced a version of its 6380 Model B4

disk unit called the Model M4. The Model M4 is functionally equivalent to the Model B4 but can only be used in disk subsystems consisting of a Model A head of string unit and one Model B. Up to two Model M4 units can be used. The M4 disk drives are available immediately and cost \$38,860. The Model B units cost \$48,700.

Maintenance prices on the 6380 line were cut by 10%. Amdahl can be reached through P.O. Box 470, 1250 E. Arques Ave., Sunnyvale, Calif. 94086.

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NEWS

TWA from page 1

allowed programmers to assign only 32K bytes of memory for variable-length tables and 132K bytes of memory for fixed-length tables. Previously, he said, if an application required larger data structures, programmers had to cheat, using spillover tables or code fillers to build larger tables.

"VS Cobol II has alleviated the old size restrictions that had been around since [the] Cobol E or F [standards]," Widmer said. "We had applications that demanded megabyte tables, and they became much simpler to support with legal code by moving them to VS Cobol II. With the new compiler, if you need a 3M-byte table, you declare it 3M bytes and it works."

A second class of applications that migrated to VS Cobol II, according to

Widmer, involved performance-sensitive systems. TWA recompiled one such massive application, which typically consumed more than 200 IBM 3033 CPU hours each month under VS Cobol II and achieved "significant" performance improvements. "We moved the application to VS Cobol II, and we benchmarked against the older VS Cobol plus [Computer Associates, Inc.'s] CA-Optimizer [Cobol code optimizer package]," Widmer said. "On that test we achieved a performance improvement in excess of 10% over the best we could do before."

The third system to be migrated was a third-party application that TWA acquired during the field test of VS Cobol II. The application had been certified by the vendor on the existing VS Cobol product, and TWA's staff spent less than a day cleaning

up the minor incompatibilities that arose from the VS Cobol II move.

Superior of Cobol-74

Widmer described VS Cobol II as a superset of Cobol-74 standards, including extensions to the language proposed in the first draft of the Cobol-80 standards, which are still wending their way toward U.S. and international acceptance. Those extensions include such things as the EVALUATE and in-line PERFORM verbs and scope delimiters.

"The extensions are things from a draft of about three years ago," he said. "But those things have, for the most part, not changed. They are not controversial issues in the evolving Cobol-80 standard."

Widmer said a few of the original Cobol extensions embodied in VS Cobol II have undergone minor revision by both the International Standards Organization and the American National Standards Institute. Thus, users of VS Cobol II may have to put some of their programs through a mini conversion if IBM later introduces a valid Cobol-80-compatible compiler once the Cobol-80 standards

are ratified by those bodies.

"What we have done in cases where the Cobol-80 standard has changed since the first draft proposal is to tell our programmers that the standard is undecided in that particular area, and we recommend that they not use that feature for now," Widmer said. "IBM has kept us advised on these issues."

Despite the inconsistencies that may arise with whatever Cobol-80 standard is accepted, Widmer said that TWA will benefit from a number of VS Cobol II features.

Widmer said VS Cobol II's subscript checker easily allows programmers to locate subscript errors, which he said are the most difficult problems to debug in a Cobol program.

"On a keyword-by-keyword basis we can make certain features disappear," Widmer said. "That gives us some standards enforcement. You can say that your programmers are not supposed to use, say, the ALTER verb. But you scan the source code and you find thousands of ALTERs. Now we have a way to really take such things out of [programming]."

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CORRECTION

Old Electric Industry Co.'s newly announced personal computer is called the IF 800 Model 60, not the 800 Model 60 as reported in the Feb. 5, 1985, issue.

Because of an omission by Datapro Corp., the cluster ratings for Innovative Data Processing's PDR software

were not included in the charts accompanying the story "Packaged software outlays rise 10% in 1984" [CW, Feb. 18].

The PDR software package earned a rating of one — the highest cluster — in each of Datapro's nine categories.

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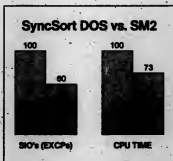
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NEWS

Sierra: Some good news, some bad for IBM 3084 users

By Jeffrey Bussard
Chicago Times Herald

Users of IBM's largest mainframes differed widely last week in their reactions to Big Blue's announced shipment schedule for its first two Sierra series CPUs [CW, Feb. 18].

By and large, customers of IBM's top-of-the-line 3084 expressed surprise and disappointment at the more than two-year delivery lead time for the larger of the two Sierra systems, the 3080 Model 400.

Other users, however, found the distant shipment date wholly unsurprising, and a few even hailed it as a boon to their planning efforts and a welcome statement of clarification about IBM's long-term direction.

Impact on processing operations?

Customers also disagreed sharply in their assessments of whether the extended delivery lead time for the Model 400 will have any noticeable impact on their processing operations. In general, companies with recently installed 3084s and highly I/O-intensive systems environments expressed confidence in the ability of their existing mainframes to meet their computing needs during the long waiting period for the high-end 3080.

But corporations whose 3084s are nearing saturation and whose applications are CPU-bound may find themselves strapped for computing power until the Model 400 begins shipping, according to various user sources.

News of the Model 400's distant release date

surprised Robert Delaney, vice-president of information services at Des Moines, Iowa-based Bankers Life Co. Delaney, whose employer uses a 3084 Model QX, had originally expected shipments of the larger 3080 family member to begin about a year earlier than IBM's stated delivery goal.

IBM 'back to its old tricks'

Also taken aback by the 400's release date was Anthony Graffeo, vice-president of management information services at New York-based Home Insurance Co. Graffeo voiced disappointment with the processor's two-year delivery lead time. With the Sierra announcement, IBM seems "to be back to its old tricks" of introducing CPUs 12 to 24 months before they are ready to be marketed, he said.

Not all MIS executives shared these viewpoints. In Southern California, for example, a 3084 user who asked to remain anonymous expressed no surprise about the Model 400's 1987 availability date, which he described as "pretty much in line with IBM's past practices."

Roughly two years transpired between the shipment of Big Blue's 3081 and 3084. So a similar lag between deliveries of the Model 200 and 400 is probably to be expected, the source said.

Although a two-year wait for the high-end Sierra mainframe may severely test some MIS executives' patience, the long lead time also has its advantages. "My reaction is that, even though shipments aren't scheduled until 1987, it's still nice to know IBM's intentions," said Clyde Whitton, vice-president of management systems at Buf-

falo, N.Y.-based Marine Midland Banks, Inc.

For Whitton, the two-year delay in the Model 400's availability eliminates much of the guesswork in forecasting IBM's long-term product moves and aids Marine Midland in planning its future hardware acquisitions.

Because the bank obtained a 3084 Model Q last year and still has plenty of unused capacity, the absence of a Model 400 upgrade is unlikely to hinder Marine Midland's computing capability soon, Whitton said.

Forced wait for natural migration path

Not every user organization, however, can make the same optimistic claim. Consider, for example, the plight of Bankers Life. Because the Model 400's extended delivery lead time has forced the company to wait for a natural migration path, Bankers Life may have to buy a second 3084 Model QX and split its on-line systems between the two machines, Delaney said.

Such a division would carry at least two penalties. First, it would compel the firm to undertake a "substantial programming effort" to bridge the communications gap between the two 3084 Model QXs, Delaney said. Second, it would inconvenience the company's end users by forcing them to use a different login procedure for each system.

Whether IBM's delayed shipment schedule provides hardships for user organizations depends "on where they are in their CPUs' life cycles," according to Charles Prid, vice-president of management services at Pricco Lay, Inc.

RATES from page 1

cess until they decide on the cost and rate structure levels," noted James Blaszak of the Ad Hoc Telecommunications Users Association which represents 30 large U.S. corporations. It has been pushing for changes in special access rates that will mostly affect private-line usage.

At the same time, large-volume users of private lines are mounting an effort to have the FCC suspend the private-line rate structure

ing proposed by AT&T Communications [CW, Jan. 28]. These users have argued that no cost support data has been filed and that the FCC's 18-day comment period was insufficient to analyze AT&T's filings.

"Judging from the pace in which the FCC is moving on special access, the AT&T private-line rates could be reality much sooner than we expect," said Brian Moir of the International Communications Association (ICA), a group that represents the largest communications us-

ers in the U.S.

Largest restructuring ever

Moir said the pending private-line rate changes "are the [largest] restructuring of private lines to have faced since the FCC's 1974 decision of having 'no sensitivity at all' to users who are trying to assess the impact of the proposed changes. It's almost an insult. ICA does not object just for the sake of objecting, but I doubt whether even the staff of the Common Carrier Bureau [of the FCC] has the slightest idea what the tariffs say." Moir said.

ICA and the Ad Hoc Telecommunications Association asked the FCC to suspend and investigate the AT&T private-line filings.

Blaszak and Moir each said that the FCC could be under pressure to link the implementation of the special access charges with approval of the proposed private-line rate revision, but they argued that this move was not justified.

Extremely ambiguous

Criticizing the private-line proposals, Ad Hoc told the FCC, "The proposed treatment of multipoint circuits is extremely ambiguous." It said AT&T proposed to assume full end-to-end responsibility for multipoint private-line access within the local exchange, but the tariffs do not say this explicitly.

"Without a commitment from AT&T Communications to assume end-to-end responsibility... users, as a practical matter, would be forced to subscribe to local [telephone company] channels,

under AT&T Communications responsibility... however, only at a substantial penalty to multipoint service subscribers. The penalty would arise because of unreasonably rigid and circuitous routing of such circuits under proposed Tariff 11," Ad Hoc said.

The group said users should be given the option of ordering multipoint access service for private lines from the local telephone companies and be able to obtain end-to-end service responsibility from AT&T Communi-

cations without incurring separate installation fees for using the local exchange instead of AT&T Communications.

However, the major argument of large users is that AT&T Communications did not file cost support data justifying the proposed private-line changes, which it is required to do under existing FCC rules. In recent months, however, the FCC has given AT&T Communications permission to dispense with cost support data on experimental tariffs.

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Used vs. new: One town, two views on buying equipment

By Paul Harnsworth
CIV Staff

HARTFORD, Conn. — It is not Ted Tansl's wardrobe that earned him the nickname "Secondhand Ted." Rather, the nickname came from the way the vice-president of MIS at Phoenix Mutual Life Insurance Co. here purchases computer equipment.

"I refuse to buy anything new," he stated. "I do not want to be on the leading edge of technology. I try to keep our hardware and software a half to a full generation behind what is new on the market."

Depreciation is one reason why Tansl waits.

"The price of a \$2 million system today could drop to \$1 million in two or three years," he said. "In addition to saving \$1 million on the purchase price, Phoenix pays lower sales and property taxes. The company can take the money it saved, put it in a bank and receive the interest."

Another consideration is that new

Phoenix's Tansl.

Across town at Cigna Corp., secondhand would be a misnomer for William Brown Jr., senior vice-president, who oversees Cigna's computer operations, which consist of more than a dozen mainframes.

Beta tests at Cigna

"We beta test a number of products and often are involved with a product before a vendor has completed its development and design," he said. "We feel it helps our competitive position if we work closely with a vendor."

The relationship provides Cigna with a clear view of what a vendor plans to manufacture. "When we are

formulating our long-range plans, we have to know what products will be available to us," he maintained. "The relationship is synergistic: Our plans are tempered by a vendor's intentions, and, to an extent, we manage vendors by suggesting what hardware we need."

One benefit is that Cigna is able to attract qualified employees. "We can tell potential employees that we offer a state-of-the-art data processing shop," the senior vice-president said. "By working with the newest equipment, their career opportunities are enhanced."

However, there are disadvantages. Sometimes Cigna's plans depend on vaporware. "There could be a prob-

lem if the vendor does not meet its delivery date," he remarked. "We attempt to plan projects on the basis of a product's availability date." When the product is delivered, it may not function properly. "When a product does not function properly, it creates competitive problems," Brown noted. "Rather than helping us do our job better than the competition, it may create problems for us."

The key to overcoming these shortcomings is good management. "A manager has to plan the project [carefully] and not depend on items that may not be delivered or function as he hoped," Brown maintained. "We always have a contingency plan available if we run into problems."

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'I do not want to be on the leading edge of technology.'

— Ted Tansl

Phoenix Mutual Life Insurance Co.

products often contain flaws. "When IBM first announced its [MVS/XA] architecture, it contained a number of problems," the MIS manager noted. "A corporation had to spend extra time and money to put the operating system into place."

There are shortcomings to Tansl's strategy. "By buying older equipment, we take a chance," he said. "One has to judge how much the equipment is worth today, what will be available tomorrow and how much your equipment will be worth when you try to sell it. I've made mistakes — waited too long to purchase a package, held on to equipment until it was obsolete. Overall, [however], Phoenix has benefited greatly by buying older equipment."

Another shortcoming is that some programmers like to work with state-of-the-art equipment. "We have to offer our employees other types of benefits," he said. "Hartford has a number of large insurance companies, and competition for data processing employees is fierce."

Tansl has structured Phoenix's work schedule so that every other week an employee has a three-day weekend.

"Employees are required to work more than eight hours each day, but they seem to enjoy the three-day weekends — especially during the summer," Tansl noted.

The MIS manager added that Phoenix may not use state-of-the-art equipment, but the equipment is not from the Stone Age, either. "We do not work with [MVS/XA] today," he claimed. "But we will move to it in time. Today, Phoenix does not need the extra channels that [MVS/XA] provides."

"As the company grows, it will require these benefits and will upgrade to it. Our employees realize that they will work with new equipment when the company needs it," according to



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NEWS

Police face allegations of accessing confidential files

By Kathleen Sullivan
City Hall Court Bureau

SAN FRANCISCO — In the wake of allegations that the San Francisco Police Department may have accessed confidential computer files maintained by the city public defender's office, city officials have launched investigations while calling for measures to prevent further abuse.

The controversy erupted earlier this month when police Lt. Thomas Suttmeier admitted that for about two months, he had access to all the files on the city's criminal justice computer system, shared among several departments. Included among the departments on the system are the public defender, district attorney, sheriff, coroner and the Office of Civilian Complaints, which handles citizens' complaints against the police.

Suttmeier, who works in the Police Department's Office of Planning and Research, said he asked the city controller's office to design a menu that would give him easy access to the files on the shared Wang Laboratories, Inc. VS 100 minicomputer system. Suttmeier said he was given an access level usually granted only to system administrators so that he could conduct an internal investigation of computer use in the Police Department.

Suttmeier described the controversy as "much ado about nothing" and maintained that he did not read or copy any files in the public defender's system or any other agency's computer.

But according to the public defender's office, which in the past has kept confidential information such as defense strategy notes and transcribed interviews on its system, the prosecution

of up to 1,500 cases may now be in jeopardy.

"Irremediably tainted"

Peter Keane, chief assistant public defender, recently told the San Francisco Chronicle that the cases have been "irremediably tainted" by the incident, explaining that the defendants' right to independent counsel had been violated "because of police penetration of attorney-client confidence." Police officers could have gained access to the system by calling up the menu, which was listed as

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The prosecution of up to 1,500 cases may now be in jeopardy.

"Tom's menu."

Keane has already asked a San Francisco court to dismiss murder charges against one client, claiming that the security breach had violated his client's ability to receive a fair trial from the city district attorney's office has countered by stating that no suspected criminal should be released unless the public defender's office can prove that the particular client's files were read by the police.

Keane said it will be impossible to prove whether the police used the program to peruse his office's files because a user could have read or printed documents without leaving any traceable

evidence of access. As the system is now set up, there is no audit trail that would record activity on the computer; the system dates a file only when it has been modified.

Remove confidential files from shared system

Mayor Dianne Feinstein has asked the Electronic Information Processing Committee, an independent group of representatives from various city agencies, to review the case and make recommendations this week. As an interim measure, Feinstein advised city agencies to remove any confidential files from the shared computer system and store them on diskettes.

The San Francisco Police Commission, which oversees the Police Department, has also ordered investigations into the matter.

Carol Ruth Silver, who serves on the San Francisco Board of Supervisors, said it was "appalling" to find out that the Police Department and the public defender's office share the same computer system, given the adversarial nature of their work. Silver said the real solution to the problem would be to give the public defender's office a separate computer system.

Jerry Herman, director of the American Civil Liberties Union's technology and privacy project, agreed with public defender Keane's assessment that the incident might have violated the confidential nature of the attorney-client relationship. He noted that with the growth in the number of data bases that are linked together in computer networks, government agencies would have to place a higher premium on security in order to protect privacy rights.

COBOL

from page 1

mainframe at the data center here.

Hollcraft acknowledged that a line of either ADF II or Mark IV could not exactly equal a line of Cobol, but he noted that another GTE data processing shop found it spent anywhere from \$25 to \$35/line to program in Cobol.

Overall, Hollcraft said, the stock replenishment program is "really an affirmation of fourth-generation tools. (The

program] was delivered on time, on the money, and it does what it's supposed to do."

Hollcraft said a big benefit of using fourth-generation tools in his shop's IBM IMS data base environment is that changes to an application can be made quickly. To illustrate, Hollcraft noted that when a major fault was found with the stock replenishment program — just a month before it was to go on-line — the fault was correct-

ed by altering only 5% of the code.

That change reduced to four to five hours the runtime of a portion of the program that had been taking 13 hours to execute.

Others who have worked with both Cobol and fourth-generation tools for IMS development, though, were not as taken by the program to ADF II and Mark IV as Hollcraft was.

Steve Phrensinger, president of IMF Consulting, predicted that "companies that commit to ADF II and Mark IV are going to become quite frustrated with the learning curve" for programmers who would prefer to work in Cobol.

"Evolution not revolution"

"I say Cobol is going to be here for some time," said Phrensinger, whose firm does consulting on IMS-based development. "What people are looking for is evolution, not revolution."

One of Hollcraft's programmers, Mike Palermo, said he originally "had a negative attitude toward" Mark IV because of his greater experience with Cobol. "As I got more familiar with Mark IV... I found you could produce reports [with it] much faster."

Hollcraft acknowledged that Syvian's Lighting's programmers probably were uneasy about the new development tools but said that a phased implementation of the two products proved crucial to their success. Although ADF II came on board along with IMS in 1978 and

Mark IV came into use there in 1981, standardization did not come until the summer of 1983.

Hollcraft also counseled those thinking of adopting an application generator to "avoid the big project" as a means of implementation. "We didn't bring in any of these tools under the auspices of a big project [being undertaken] in short time frame."

The standardization was greatly aided by the full sup-

port of management, Pearce noted.

The on-line order entry stock replenishment system at Syvian's Lighting was not a new one; it had existed five years but in a Cobol version that had received many patches. The final straw, Hollcraft explained, came when Syvian's Lighting decided to add two warehouses to its system and found the program would not accommodate them without requiring changes in its master file.

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NEWS

E-MAIL from page 1

Computing Corp.; General Electric Information Services Co.; Compuserve Corp.; and Budget Time Share, Inc.'s subsidiary Electronic Communications for the Home and Office (Echo), Western Union's and MCI's presence will encourage change as all players revamp to reach this broader user base.

The baseline electronic message delivery services offered by all the companies—including the data network carriers GTE Telenet Communications Corp., McDonnell-Douglas Automation Co., Tymnet, Inc. and ADP Network Services, Inc.—are similar in function. They support electronic mailboxes that users can access to read and leave messages.

Anonymous devices enable
A multitude of anonymous

nous communications devices can be used with the services, including personal computers, terminals, some electronic typewriters and teletext terminals.

All communications devices used with the electronic mail services must have a 300 to 1.2K bit/sec modem. Personal computer users also need the associated communications software, which many of the services providers sell for a nominal fee.

In practice, an electronic mail user can create a message on his personal computer, log into the service, specify the name of the person or mailbox the message is destined for and upload the file. The recipient, using a similar or different type of communicating device, is able to retrieve his messages electronically after logging into the electronic

mail service.

Pricing method varies

Traditionally, time-sharing companies and value-added network carriers priced their electronic mail services like they did their other services—on a time basis that also takes into account the amount of computer resources used. Western Union's and MCI's



pricing structures are transaction-based like those of regular mail. The distinguishing feature of Western Union and MCI services, however, is their hard-copy delivery options. Whereas the traditional electronic mail services required the intended recipient to be a subscriber of the service used, Western Union and MCI enable messages to be transmitted electronically to a printing location near the recipient and then delivered within a few hours or overnight by a courier or through first-class mail.

While opting for hard-copy delivery negates half the beauty of electronic mail, it at least enables the sender to cut down on document creation time, provides for the second fastest type of delivery and vastly increases the number of users that can be reached.

Weight against alternatives

Reducing electronic mail to hard copy for delivery makes it necessary to weigh these services against other delivery alternatives, such as use of facsimile machines. Facsimile is faster and cheaper than the hard-copy delivery options offered by electronic mail services, but there are several caveats—compatible facsimile machines must be used; the print quality cannot match that of the electronic mail services' laser printing; and with facsimile machines it is not possible, as it is with electronic mail, to broadcast a document to multiple locations during the same sending session.

In consideration of any electronic mail service, it is important for users to be able to control and monitor service use. Because of the nature of their business, computer time-sharing companies more often than not provide the best management controls for electronic mail.

'Implement controls'

According to Andrew Rev, vice-president of marketing for Echo, a firm located in Marina del Rey, Calif., "If you want to implement electronic mail successfully, you have to implement controls similar to those used to manage telephone systems."

Echo reportedly provides detailed billing information that includes the following: the average number of char-

acters per message, profiles of message distribution, a message completion rate that compares the number of letters composed with the actual number of messages sent as well as details on what percentage of correspondence went to senior management.

Other control features offered by Echo include the ability to monitor the use of the Help key. By pinpointing when most users ask for help—for example during message creation, transmission or retrieval—managers can possibly effect some change that would facilitate service use.

Hard figures

In addition, Rev said that each Echo user is asked to specify how the message would have been relayed if Echo was not used. Tallying this data gives the communi-

cations manager hard figures to use in cost-justification calculations.

Beyond cost-justification calculations—which are hard enough, given the intangibles that must be studied, such as percentage of telephone tag eliminated and other productivity concerns—comparing services by cost is made difficult because of the different pricing structures used. Large volume electronic mail users, for example, may benefit by using a service that charges by the hour rather than by transaction.

Ultimately, the most efficient and cost-effective electronic mail will be that which is created, stored and retrieved electronically, regardless of the fact that available hard-copy delivery options are spurring growth in the use of electronic mail today.

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Electronic Delivery Costs	MCI Instant Message \$17/500 char. \$45,000 char. or less	\$30/min at 300 bit/sec; \$45/min at 1.2K bit/sec (see notes)	\$10/hr at 300 bit/sec and \$12/hr at 1.2K bit/sec during peak hours. \$5 and \$9, respec- tively, for off-peak use.	\$14/hr during peak hours and \$0.05/1,000 char.	Service: 1. \$14/hr prime time; 2. \$12/hr; 3. \$10.50/hr. \$8.50/hr for off-peak usage for all services. (see notes)
Mail-Box Delivery Service	Subscribers to MCI Mail must be on MCI Mail to receive off-line mail. MCI Mail is a full-service mailing system, including overnight, etc.	Subscribers to MCI Mail must be on MCI Mail to receive off-line mail. MCI Mail is a full-service mailing system, including overnight, etc.	Subscribers to MCI Mail must be on MCI Mail to receive off-line mail. MCI Mail is a full-service mailing system, including overnight, etc.	Subscribers to MCI Mail must be on MCI Mail to receive off-line mail. MCI Mail is a full-service mailing system, including overnight, etc.	Subscribers to MCI Mail must be on MCI Mail to receive off-line mail. MCI Mail is a full-service mailing system, including overnight, etc.
Message Alert Option	MCI Alert, phone verification of message delivery, \$1 per message.	Test marketing use of paging device.	Not available	Not available	Not available
Mail-Box Delivery Capability	Not available	Yes	Yes	Yes	Yes
Message Forwarding to Autospacer Device	Not available	Yes	Not available	Message Delivery to network address and off net telephone numbers.	Not available
Notes	The following mailing system, including on-line mail, is available to subscribers to MCI to be used for on-line mail.	The following mailing system, including on-line mail, is available to subscribers to MCI to be used for on-line mail.	The following mailing system, including on-line mail, is available to subscribers to MCI to be used for on-line mail.	The following mailing system, including on-line mail, is available to subscribers to MCI to be used for on-line mail.	The following mailing system, including on-line mail, is available to subscribers to MCI to be used for on-line mail.

C/O Data

Despite risks, firms eager to enter E-mail market

By John H. Cox Staff

Although still a young market segment, electronic mail services have already experienced some turbulence.

When Western Union Corp. and MCI Communications Corp. entered the fray, the U.S. Postal Service (USPS) decided to exit, page left. And now, AT&T is prepared to be re-entring a service for release later this quarter.

After spending \$60 million into its development and suffering continued losses—an estimated \$16 million in 1984—the USPS decided in June to divest its Electronic Computer-Organized Mail (E-Com) system.

By Dec. 14, Ross-Allen Acquisition Services, Inc., which had been retained to architect the divestiture, had reportedly brought together several potential buyers. The divestiture of some of these buyers to participate in further negotiations during which they were to be sold to the highest bidder and equipment transferred prior to the divestiture. The divestiture of the USPS system will take place in the next few months.

While the USPS would not identify any potential buyers, companies that already provide electronic mail services may be among the bidders. The USPS system is a 25 service point office with computer mail processing capabilities. The E-Com system would complement other electronic mail services that do not offer delivery options.

As the USPS moves to sell off E-Com, AT&T is said to be about to unveil its own version of electronic mail. The move comes just days after the company's announcement of a service similar to Western Union's SecureMail. This service that may be similar to AT&T's service to the business for use in order entry applications.

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Micro software site licensing gathering user support



ON AT
INFO/CENTRAL

By Thomas McElwain
CI Staff

CHICAGO — For corporate users of micro software packages, site licensing is an issue whose time has come, according to a random sampling of opinions from the floor of Info/Central: The Information Management Exposition & Conference, held here last week. Under site licensing, a user company signs a single license agreement with a vendor covering all use of a particular software package at that site.

"It's right around the corner, either this year or next," said Robert Owen of Barker-Coleman, a \$250 million manufacturer of electronic instrument and energy management systems in Rockford, Ill.

The company uses about 100 micros throughout its 3,000-employee operation and licenses Lotus Development Corp.'s 1-2-3, Software Art's Inc. Vi-

sical, and Micropro International Corp. Wordstar products. Scattered use of the micros, however, prevents the company from pursuing any type of site licensing policies, Owen said.

Owen said he would support site licensing to eliminate possible lawsuits against the company from vendors charging software piracy, noting

”

"It's a matter of letting the vendors know what you need."

— John Schlikk
University of Wisconsin

that, "You can't stop the copying" of micro software packages.

But Owen voiced concern about the costs of site licensing, saying that too high a site license fee could make it cost prohibitive.

With a "couple of hundred" IBM Personal Com-

puters and Compaq Computer Corp. Compaq micros in use at his company, James Burnett, manager of the information center and automation support at Babco & Wilcox Co. in Barberton, Ohio, said site licensing is being examined by his company's corporate MIS group.

Although his firm buys its micro packages at wholesale prices, Burnett said a site licensing policy would be the optimal purchase route for Babco & Wilcox, which uses Lotus' 1-2-3 and Lotus' Symphony spreadsheet packages. "If someone came up with a decent spreadsheet with a site license, we'd be interested," he said.

The site license is of particular interest to universities with large installed bases of microcomputers.

"From an [educational] point of view, [site licensing] has to become a reality," said Jim LaBarre, professor of MIS at the University of Wisconsin in Eau Claire. The university has approximately 155 micros in the MIS department, he said. "We can't afford to go out and buy 20 copies of [Ashton-Tate's] Dbase II — which we did this summer. They're forcing us to violate the copyright."

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Decline in sales triggers layoff at Intel

By Kathleen Burton
CI West Coast Bureau

SANTA CLARA, Calif. — Intel Corp. said last week it will lay off about 4% of its work force, phase out two production facilities and shorten the workweek at two others because of deteriorating semiconductor sales and disappointing growth in systems sales.

Intel spokeswoman Rebecca Wallo said two-thirds of the 900 jobs being eliminated are in production, and the remainder are production managers and supervisors. Intel has no further layoffs scheduled, Wallo said, but "cannot rule them out."

Due to an accelerated decline in orders during the past few months, other chip manufacturers have taken steps to cut costs and reduce inventories. National Semiconductor Corp.'s Sunnyvale, Calif., plant was shut down for two weeks this month; Monolithic Memories, Inc. in Santa Clara stopped production for one week; and Dallas-based Texas Instruments, Inc. announced a reduction in force numbering 2,000 people last October.

Intel will dismiss 500 employees at its Hillsboro, Ore., systems and components division and 100 employees at its Phoenix manu-

See LAYOFF page 13

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Charters map out course of companies' MIS missions

By Jeffrey Shuster
 CIO West Coast Bureau

Eager for new career challenges, a disaffected programmer recently quit his longtime job and went to work for another company. The unexpected departure created a vacancy that the former employer wasted no time trying to fill.

A nearby employment agency, sensing a possible opportunity, quickly located an ideal candidate for the position and notified the prospective client firm. At first, the company's reaction to the overture was enthusiastic.

The initial elation, however, promptly gave way to disappointment when the client learned the candidate's identity. Unknown to the headhunter, the prospect, whose qualifications it was touting so highly, was the same programmer who had left the employer only a few weeks earlier.

Such misadventures are by no means unusual, according to Leilani Allen, assistant general manager for the Sunnyvale, Calif.-based Institute for Information Management (IIM). In large corporations throughout the U.S., computing professionals routinely change jobs to pursue professional opportunities that their former employers were secretly planning to make available only a few months down the road.

In Allen's view, unnecessary turnover in the MIS ranks often stems from a simple failure of communication. With disturbing frequency, information systems directors keep

their future intentions a secret from their own staff and, thus, lose valued employees they might otherwise retain, Allen said.

But awareness of the communication breakdowns and their often harmful side effects appear to be growing rapidly — a development that accounts in part for today's pervasive interest in information charters. In essence, an information charter is a formal document that defines a systems organization's reasons for existence and makes the reasons explicit for a corporation's key departments and divisions.

"Some of the Fortune 500 corporations that are well-known for their strategic planning have had informa-

tion charters in place for as long as five or 10 years," Allen said. "For them, the subject is pretty ho-hum."

But for a host of other companies, information charters are still regarded as something of a novelty.

"DP operations tend to assume that everyone else already knows what they do, but very often, that assumption just isn't the case," Allen said. "So the whole point of doing an information charter is to formalize a decision-making process that, in many cases, is implicit."

For Allen, an information charter's chief value is as a communications device. "People down at the bottom of information systems departments constantly tell us that

they get no direction from management and that they don't know what their strategies and critical success factors are," she said. "They often have the impression that management has no concept of where the department is moving."

The problem here is not that systems executives neglect to plan but that they often withhold their plans from the subordinates who ultimately have to implement them, Allen said. But by circulating an information charter among the MIS rank and file, computing department directors can forge a common understanding of what their organizations are trying to accomplish and what they consider their top priorities.

Communicating key to strategy

Information charters can prove useful to MIS executives by helping them communicate to senior management and to their own staff members.

Unless a company's key strategies are kept consistently shared of their systems directors' intentions, the firm's information processing strategies run the risk of "getting out of sync" with its overall business plan, according to William Paul, a speaker at a recent Institute for Information Management symposium in Carmel, Calif.

Paul, the information systems vice-president for Atchafalaya, Tepeha & Santa Fe Railway Co., said, "If a charter isn't written down somewhere, everyone will have goals in his head, but they may not necessarily be the same."

Similar comments were expressed by Douglas Murray, information processing director for Dublin, Calif.-based Lucky Stores, Inc., which began developing an information charter in 1982.

His overview, however, finds information charters especially "valuable because they don't change," especially if a company is just beginning to integrate information systems as a major concern, according to Joseph Orlandini of Southern Pacific Transportation Co.



NEWS

OMB: Improve DP investments, cut software costs

By Mitch Davis
CI Washington Bureau

WASHINGTON, D.C. — The Reagan administration last week issued management directives that will require federal agencies to obtain a minimum 10% return on investment for all computer technology and to cut software maintenance costs by 25%.

The U.S. Office of Management and Budget's (OMB) "Management for Fiscal Year 1986" report said the moves are needed to "recapture the government's position as a leader in the efficient and productive use of information technology." To accomplish this, the OMB established the following three management principles.

■ Agencies will be required to document at least a 10% return on their information technology investments. "Investments in information technology must be treated in a businesslike manner, and

the gains from automated projects should be monitored and realized," the OMB report said.

■ Agencies will be required to implement standards that foster open systems of communication and permit the exchange of information among systems. The OMB said it will undertake a project to determine whether to adopt interconnection standards from the International Standards Organization.

■ Greater reliance will be placed on the acquisition of commercially available software to reduce the government's dependence upon locally developed, customized software. Software costs today amount to 60% of federal computer expenditures, compared with 20% in 1965, the OMB said.

On the subject of software management, the OMB said that because the federal government continues to custom-develop 90% of its software, the transition to modern, efficient hardware is in-

hibited by large volumes of custom code that require conversion.

"The private sector also is investing more in off-the-shelf software packages than in custom-developing new software. Such packages have the advantages of being maintained by the vendor and do not require substantial in-house technical staff," the OMB report said.

The OMB said agencies will be asked to reduce their software maintenance costs by 25% and their software staffs by 5,000 full-time positions over the next three years.

Consistent with this initiative, the Internal Revenue Service and the Federal Aviation Administration will be converting systems to high-level languages to increase portability, and the Veterans Administration is studying the feasibility of converting its "antiquated" insurance software to a modified commercial package, the OMB said.



Computer crime bill unveiled for federally insured banks

WASHINGTON, D.C. — U.S. Sen. Paul S. Trible Jr. (R-Va.) introduced the Computer Systems Protection Act of 1985 (S. 440), a bill that would assert federal jurisdiction over computer crimes affecting federally insured banks and businesses in interstate commerce. The bill would make it a felony to use a computer to commit a theft or to damage or destroy information stored in a computer. In addition, the bill would make it a misdemeanor to access intentionally a computer without authorization.

Trible's bill establishes federal jurisdiction over computers used by entities engaged in interstate or foreign commerce, and by certain financial institutions.

The proposed maximum penalty for the felony is five years in prison and a \$50,000 fine; the maximum penalty for the misdemeanor is one year in prison and a \$5,000 fine.

GSA micro network raises productivity, reduces costs

WASHINGTON, D.C. — A local network of microcomputers at a U.S. General Services Administration (GSA) regional office has increased employee productivity and decreased the cost per unit of work, according to a study by the U.S. Office of Personnel Management.

Work studies before and after installation of the Merlin experimental network demonstrated the effect of office automation on productivity at the GSA's San Francisco office, according to Edwin W. Thomas Jr., GSA regional administrator.

The Merlin system now includes 84 IBM Personal Computers connected by a local-area net from Nestar Systems, Inc. of Palo Alto, Calif. An electronic library provides such software as word processing, graphics, electronic mail, data management, project management and calendars.

The study did not quantify the overall results but calculated the improvements for specific tasks.

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SPEAKS IN



NEWS

Stockman halts plan to replace federal telecom service

By Mike Settle
CW Washington Bureau

WASHINGTON, D.C. — David A. Stockman, director of the U.S. Office of Management and Budget (OMB), has put the brakes on the federal government's plan to replace its 23-year-old Federal Telecommunications Service (FTS) — the largest private-line network in the world — with a state-of-the-art system capable of voice, data and video traffic.

Shortly after the U.S. General Services Administration (GSA) opened the bidding process for the FTS replacement system earlier this month, Stockman abruptly halted the procurement process pending a White House review of the budget, policy

and technical ramifications of the \$4.5 billion replacement program.

In a Feb. 15 letter to Ray Kline, acting GSA administrator, Stockman ordered, "You are to take no further action toward the award of a contract pending the completion of a broader executive branch review."

Vendors already briefed

Only two days before, GSA officials had briefed scores of telecommunications vendors, saying the GSA planned to award a 10-year contract in fiscal-year 1987 that could produce revenues exceeding \$4 billion over the life of the contract.

Stockman wrote that it would be "premature to begin a procurement

of this magnitude, which could define the structure of federal telecommunications for the next 30 years, without a thorough policy and budgetary review by OMB, the user agencies and the [U.S.] Department of Justice."

Furthermore, Stockman questioned "what the technological and economic assumptions underlying the strategy are, whether a central service should carry data as well as voice traffic, what current or proposed standards would apply and whether and under what circumstances agencies would be required to use such services."

At the public briefing, GSA officials announced that they are seek-

ing a single prime contractor to provide one-stop communications services and total management of the intercity system and a substantial price discount.

The contractor will design and organize the system, provide the services defined by the GSA and then bill the GSA on a usage basis, the officials said.

The FTS now serves 1.3 million users nationwide, organized around 1,655 local private branch exchanges and Centrex systems.

It carries 1.5 billion minutes of traffic annually and consists of 52 major switching centers, about 15,000 long-distance trunks, 35,000 access lines and 10,000 miscellaneous circuits.

Expenditures for intercity FTS service are expected to reach \$450 million this year, GSA officials said. Though the FTS today is nearly an analog switching system, it is carrying an increasing volume of data traffic — about 15% of current traffic — and sometime in the 1990s, the data traffic is projected to exceed analog messages, GSA officials reported.

99

It would be 'premature to begin a procurement of this magnitude... without a thorough policy and budgetary review.'

— David A. Stockman
U.S. OMB Director

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NEWS

DP director charged with copying system

Allegedly reproduced, sold hospital's customized IBM software

By Charles Babcock
Of New York Bureau

NEW YORK — A Long Island man has pleaded innocent to a charge of copying a hospital's version of a \$300,000 IBM Patient Care System and selling parts of it to another hospital.

The accused man, Frank Russo, 40, served as director of systems analysis at University Hospital in Stony Brook, N.Y., between 1977 and 1983.

Russo was indicted recently by a Suffolk County grand jury for allegedly making illegal use of secret scientific material. He allegedly copied features of the patient care and hospital services system at University Hospital and sold them to Albert Einstein Medical Center in Philadelphia, according to spokesmen for New York state Deputy Attorney General for Medicaid Fraud Control Edward J. Kuriansky.

The IBM package was purchased by University Hospital in 1979, and Russo was commissioned to install, maintain and develop it, according to J. Howard Oaks, vice-president for health sciences at University Hospital.

"It was a highly automated system, the most sophisticated system we could find," said Oaks, who noted that the decision to buy it was made before Russo was hired.

Russo occupied a senior management position and was quite visible in talking about the system and how it should be developed, noted Oaks, who was called to testify before the grand jury.

Russo also was president of Stony Brook Systems in nearby Hauppauge, N.Y., now a division of Travenol Laboratories, Inc., a hospital supply firm in Deerfield, Ill. Stony Brook Systems was also named in the indictment.

The indictment stated that Russo "used his position as director of University systems analysis at Stony Brook University Hospital to make an electronic reproduction of certain secret scientific material, namely the hospital computer program worth over \$300,000, without the

knowledge of the hospital, and sold features of it."

The indictment did not state in what form the copy was made, but a spokesman for Albert Einstein Medical Center said that he believed it was delivered on tape.

Oaks noted that the five-year-old University Hospital, part of the State University of New York at Stony Brook, was considered an innovator in hospital computer services, and Russo showed "a steady stream of visitors" around the site.

The original software, IBM's Patient Care System, was not an applications package but a framework with its own very high-level development language, and the hospital developed its own system with it and continuously upgraded it, said Paul R. Vergola, deputy director for information services at University Hospital. "It was a leading-edge system," he said.

The Patient Care System ran on an IBM 3031 when it was purchased and was recently transported to the hospital's new 3083, he said.

The section of the state criminal code used to obtain the indictment, "Theft, Other Offenses," was intended to fill the gap left by

stealing tangible property vs. photographing or otherwise reproducing proprietary material and making use of it, according to the state deputy attorney general's staff.

The section of the code has not been used very much, noted Sonya M. Hoover, spokeswoman for the deputy attorney general's office who said the special prosecutor's staff had difficulty finding citations of any previous cases involving software.

Hoover said the indictment did not list how much Albert Einstein Medical Center had paid for the software.

The offense for which Russo was indicted is a felony punishable by four years in prison in his case or a \$10,000 fine in the case of Stony Brook Systems. Russo was released on his own recognizance after pleading innocent to the charges. A trial date was set for April 23.

Piracy suits on the upswing

A spokesman for IBM said the number of lawsuits relating to copying software is on the increase. Copying microcomputer software is one part of the phenomenon, but those who make a few dollars selling pirated micro software sometimes realize that mainframe software in thousands of times more valuable, said IBM spokesman J. Lyle McGuire at the firm's Armonk, N.Y., headquarters.

The frequency of lawsuits may be increasing because the incidence of copying are on the upswing or because detection has improved, McGuire said. It is usually difficult for someone to copy mainframe software, except for one or two of the highest ranking persons in the MIS department, he added.

Richard A. Hasbath, director of academic computer services at neighboring Long Island University, where computer security is an academic subject, said that it is difficult for an organization to protect itself from software duplication by highly placed key personnel.

The problem of it

"It would have been very simple for someone in Russo's position to make a copy. No problem at all," Hasbath said.

Frank Russo served as the director of systems analysis at University Hospital in Stony Brook, N.Y., from 1977 to 1983 and was indicted recently by a Suffolk County grand jury for allegedly copying features of a patient care and hospital services system at University Hospital and selling them to Albert Einstein Medical Center in Philadelphia.

"You have to trust people in those positions. How do you guard against the guy who has the key to the bank vault?" Hasbath said.

IBM's McGuire said his company recommends creating a strong audit trail that will detect when software copying devices have been used, recording which terminal or console issued the commands and under whose password.

"Knowing you'll be caught if you copy something is the best preventative measure," he said.

In a properly managed shop, he added, the people who write software don't maintain it, those who maintain it don't copy it, and those who copy it don't write it, leading to a need to enlist three people and three passwords before a duplicate of mainframe software could be made.



'[Russo made] an electronic reproduction of certain secret scientific material... worth over \$300,000.'

— Suffolk County grand jury indictment

by prohibitions against

photographing or otherwise reproducing proprietary material and making use of it, according to the state deputy attorney general's staff.

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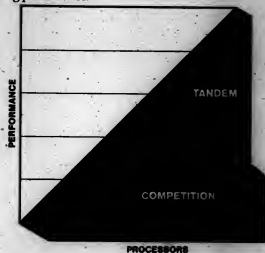
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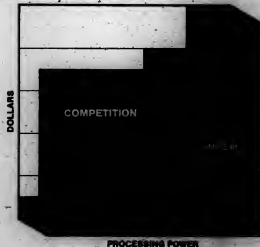
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NEWS

Wary of DEC upgrading, AMS may seek other vendor

By Susan Rainmond

On Staff

PROVIDENCE, R.I. — The American Mathematical Society (AMS) here loves its Digital Equipment Corp. Decsystem-20 computer system, owns more than \$200,000 worth of DEC peripheral equipment and is happy with DEC's service and merchandise. Yet the AMS is considering a move to another vendor.

The society is in the process of examining a number of computer systems to replace its outdated installation, said Samuel B. Whidden, director of computer services. If the AMS goes to DEC equipment and the VMS operating system, "How heavily should we rely on [DEC] to be con-

cerned with the ease with which [we] will be able to move from its VMS operating system to whatever follows it?" he asked.

Whidden said he is concerned that when DEC decides to implement a different technology in the future — such as reduced instruction set machines, data base machines or some combination — DEC's new systems will not be upwardly compatible. "It isn't terribly reassuring to look at what they've done to the 36-bit customer base," he added.



On photo by D. Rainmond

Whidden

Whidden and Barbara Venzian, manager of programming and systems analysis at the AMS, were taken by surprise in the spring of 1983 when DEC killed the Jupiter project, its upgrade path for Decsystem-10 and -20 users, Whidden said. Whidden had attended a nondisclosure meeting with DEC where timetables for the Jupiter were discussed.

Whidden said the AMS' first Decsystem-20 was purchased in 1978 and was used exclusively for business applications and scientific

(mostly mathematical) typesetting. One year later, a Decsystem-2060 replaced the first machine, and in February 1983, a second Decsystem-2060 was added to help ease what had become an eight-year backlog, he said.

At the time of the second computer's purchase, the AMS started a data base project and planned to upgrade to the Jupiter system when the data base was ready to use, Venzian said.

Based on what he knew about DEC and its 36-bit machines, Whidden had concluded that DEC would not abandon the Jupiter project, even though he heard rumors that such a cancellation was possible, he said. DEC widely used the 36-bit machines itself, he said. DEC had a large installed customer base, and company representatives had strongly said they would not abandon the project.

The Decsystem-20 is also excellent as far as hardware and software, Whidden said. "We've had [a DEC Tops 20 operating system] here since 1978, and we are delighted with it," he said. Its user friendliness was in large part responsible for the quick acceptance of interactive use at the AMS, he said.

DEC must be working on other machines, as the VAX has been out for 10 years, Whidden said. The company's small-end computers — DEC Decmates, Rainbows and Professional — do not form a consistent line, he added. Given that the line is not totally integrated and DEC changed its mind about the Decsystem-20s after promising additional upgrades, Whidden said he is not ready to trust them to continue with an integrated line.

If the AMS stays with DEC equipment, it will save a lot of money on peripherals, Venzian said. The society owns nine RPOs and three RPO7 storage devices, which is an indication for it to stay with DEC, although DEC does not have an edge over other systems the search committee is looking at, she said.

The AMS sent requests for proposals to eight vendors and has narrowed the choices to DEC, Data General Corp. and IBM, Whidden said.

Buying in at top of the line

With DEC, as with most of the other vendors approached, the AMS would be buying in at the top of the company's line, a position it does not relish, Whidden said. "We're hoping [the vendors] will engage in consistent development," he said. One advantage that IBM has over the other vendors being considered is that the society would be buying into the middle of its line, he added.

Whatever the outcome of the computer system search, the AMS hopes to keep its Decsystem-20s for a long time, Whidden said. The society's operations manager, George Ogilvie, has customized the system by loosely coupling the two machines with a shared disk drive, which is clumsy and slow but adequate, he said.

DEC's promised 10-year support seems fair to Whidden and Venzian, in light of its discontinuation of the line, Whidden said.

Ogilvie has managed to get DEC to sign a six-year service contract recently, and the AMS is gearing up to convert systems before the end of the year.

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NEWS

False arrests require police to monitor systems closely

By Dennis Robinson
CW Staff

NEW ORLEANS — The city of New Orleans' Police Department and adjacent Jefferson Parish's Sheriff's Office have agreed to monitor their computer systems carefully in an attempt to stop wrongful arrests.

The agreement is part of a consent decree in response to a class action suit filed by the American Civil Liberties Union (ACLU) early in 1983 (CW, March 21), which charged the agencies with false arrests due to computer programming errors, said Martha Kegel, executive director of the ACLU of Louisiana.

The decree will require New Orleans police and the Jefferson Parish Sheriff's Office to improve the accuracy of information on the computers and comply with state and federal privacy laws, said Bob Flinkenstein, city attorney for the New Orleans po-

lice department. The police department and other criminal justice agencies that use the system will continue to update the system and provide training and education for all users, he said.

Federal magistrate Ronald Posner will retain jurisdiction over the case until both the ACLU and the police departments consider the problems solved, Kegel said.

Early in 1983, Shirley Jones brought the suit against the police departments after she had been wrongfully arrested by the Jefferson Parish Sheriff's Office, Kegel said. Jones' name happened to match an alias used by a wanted woman, she added. Although none of the other data matched, the officer arrested Jones, she said, partly because he did not trust the computer file to be accurate. Jones could not be reached for comment.



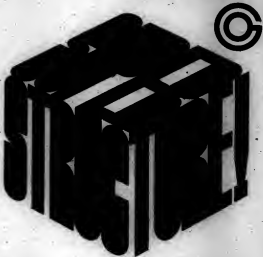
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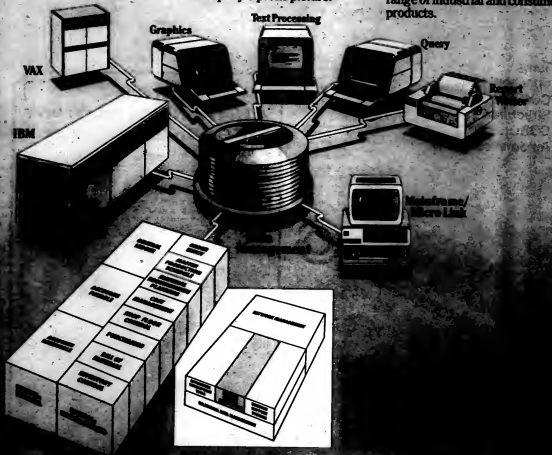
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NEWS

Computers fill openings for DP personnel recruiters

By Maureen McInerney
CWI Staff

The new fiscal year is under way, users group budgets and strategic plans have been laid out for weeks, and your Ada programming specialist just announced he has found greener pastures at a nearby competitor. Although there is a file of resumes in your office, you cannot quite

find the time to read through them. Advertising is always possible, but that can take weeks.

DP managers facing a situation like this are turning to computers for help.

Like any other company in the market for a DP professional, Advanced Systems Applications, Inc., employs traditional recruitment tac-

tics including bold advertisements and aggressive headhunters.

Last June, however, the firm, which provides software packages and processing services to the group health insurance industry, began employing yet another tactic.

Advanced Systems purchased access to a computer-

ized data base of professionals seeking jobs in DP, engineering, finance and accounting, marketing and human resources. "We use it in addition to the current bag of tricks available," said Trudy Norman, Advanced Systems' manager of human resources.

The data base Advanced Systems uses was developed

by Computer Assisted Recruitment International, Inc. (Cari), of Schaumburg, Ill., one of several computer-based recruiting services that have emerged over the past several years.

Using a personal computer, Advanced Systems personnel access the data base, which is housed and maintained locally at Cari and accessed through General Electric Information Systems Co.'s Mark III network. Through Cari, Advanced Systems identified 25 potential candidates and interviewed about 10, Norman said. Nine of those candidates was hired, however, because Advanced Systems did not make offers fast enough, Norman said.

High hopes

Nevertheless, she said, she has high hopes for the computerized service and said that if the service nets her between three and five hires in one year, it will still cost less than agency fees. "You really need only one [hire] to make it cost-effective," she said.

According to Raymond Casper, president and co-founder of Cari, for a \$5,000 annual subscription fee, companies with a modem, keyboard and screen printer receive a piece of communications "software" that gives them unlimited searching capabilities. Companies can further access up to 250 names, addresses and telephone numbers of potential candidates. Companies wanting information on additional candidates are charged another \$5,000.

Cari incorporates a purging system that keeps the data base current with applicant information. Candidates are required to renew their candidacy with the company every 60 days. If candidates do not renew, they are removed from the data base, Casper said.

The scarcity of West Coast-based professionals in the Cari data base forced Automatic Data Processing, Inc.'s division of dealer services in Portland, Ore., to abandon the service rather than woo and then relocate recruits, according to Gwen Weld, the firm's personnel director.

Automatic Data Processing purchased access to the Cari data base last year when it was trying to add about 50 DP professionals to its staff of 200 but dropped the system after two months, Weld said. "If we could have pulled two people a year out of that system, it would have been worth our money," said Weld, who spends between \$7,000 and \$12,000 per hire for agency fees.

See J08B page 27

HOW THE WORLD'S LARGEST COMPANY TAKES MESSAGES FROM AROUND THE WORLD.



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NEWS

JOBS from page 26

Parlow & Associates, Inc., a South Holland, Ill., data processing consulting firm, turned to the computerized data base as a time saver, according to Dale Gouwens, vice-president. "We can recruit people a lot faster," he said. "Within 30 minutes, I can give the system my requirements, and it will tell me the candidates and print the resumes within 30 minutes. In an hour's time, I can be looking through those resumes, and in two hours, I can be calling people to set up interviews." Gouwens compared that method with the process of placing a help wanted ad, which can take up to two to three weeks between placing the ad and interviewing an appropriate candidate.

In the first three months that Parlow & Associates used the service, it

hired three professionals, saving the company about \$10,000 to \$15,000 in agency fees, he said. "It is not a replacement for an ad or a search firm, but we use it as our primary source [of recruitment] and ads and firms as our secondary source."

While Carl is a national data base, computerized high-tech recruiting is also done on a local basis. Software Career Link in Burlington, Mass., sponsors of local job fairs designed for software professionals (CW, Nov. 25), has been experimenting with a subscription service for job seekers in the Boston area.

By December, the company had approximately 10,000 names of potential applicants in a data base maintained on an IBM Personal Computer AT. According to Software Career Link's Paul Vincent, by the second quarter of this year, the

company expects to implement a subscription service at each of the major cities where it conducts its "Soft-fair."

For a \$9,000 fee, companies subscribing to Softview are guaranteed at least six hires, Vincent said. Companies that hire less than six employees through the service are reimbursed for up to six "nonhires" at a rate of \$1,500 each. To help promote the service, companies subscribing to Softview also receive free attendance at the Softfair in their area. Companies that hire more than 12 employees found through the subscription service pay an additional \$1,000 per hire, he said.

Vincent said that firms subscribing to the service send their job specifications to Software Career Link, which feeds those requirements through the Personal Computer AT.

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NEWS

IRS, union join to implement incentive pay program

By Mitch Seltis
CW Washington Bureau

WASHINGTON, D.C. — When it comes to implementing an incentive pay program for data entry clerks, the Internal Revenue Service has found it much better to cooperate with its labor union than to fight it, according to M. Eddie Heironimus, associate IRS commissioner for data processing.

After years of acrimonious and costly battles between IRS management and the National Treasury Employees Union (NTEU), the data transcribers union, the two are now cooperating on the implementation of a nationwide incentive pay program that is scheduled to begin in October,

Unions often oppose incentive pay programs on grounds that they pit one worker against another in an effort to obtain productivity goals that are set by management.

Heironimus said in a recent speech here.

This effort follows a successful test of the incentive pay program at four IRS service centers, where transcribers enter data from taxpayer forms into the computer, IRS and union officials said.

The design of the IRS program is

one of the best in the public or private sector, according to Dr. Alan F. Westin, a Columbia University professor who has conducted research on labor issues in office automation (CW, Dec. 24). "I'm not a fan of incentive pay programs [unless they] have what I think are the elements of justice, mutuality and participation that

the IRS system has," he said.

Unions often oppose incentive pay programs on grounds that they pit one worker against another in an effort to obtain productivity goals that are unilaterally set by management, Westin said.

The IRS program establishes a historical base rate for data entry and a target rate that reflects higher productivity; transcribers receive 50% of the savings achieved if they meet or exceed the target rate and if quality standards are met, Heironimus said.

Designed by labor, management

The key feature of the program is that the general design was established by a national committee of labor and management officials, and details such as the base, and target rates are decided and administered by a local joint committee at each data center, he said.

Westin said the IRS program is exemplary because it shares the productivity savings with workers and was not unilaterally imposed on labor by management. In addition, he said, the IRS has pledged not to put transcribers on the dreaded treadmill.

Westin explained that some employers start an incentive pay program and then continually raise the threshold at which workers get extra pay. "So the feeling is that you're on a terrible treadmill, and that the management is constantly speeding up the pace of the work," he said.

Test program improved labor relations

Heironimus said the IRS test programs had been successful in both raising productivity and improving labor relations.

Likewise, NTEU's negotiator, Dennis Reardon, called the test program successful, and said the union supports expansion of the program to all IRS data centers.

"The cooperative effort obviously makes it attractive to NTEU," Reardon said. "It gives employees the opportunity to participate in the design and development of programs at their work sites," he said.

But labor and management discussions of the incentive program were not always so harmonious. In 1980 and early 1981, relations between the IRS and NTEU hit bottom, and the IRS plan for incentive pay was mired in a thicket of charges and countercharges at the Federal Labor Relations Authority. (The NTEU said the program should be part of formal labor contract negotiations, and the IRS disagreed.)

In early 1981, Heironimus said, the parties recognized that incentive pay would benefit both the union and IRS management, so they agreed to form the national joint committee and begin informal talks. The ground rules were that both parties had to temporarily shelve their legal disputes, and either party could leave the talks and return to formal proceedings, he said.

The process enabled the IRS to "improve productivity and share savings with workers while at the same time avoiding the costs associated with negotiation [and] arbitration and the formal structured approach to bargaining," Heironimus concluded.



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NEWS

Ancient language may prove key to translation system

By Nikki Bette
C/O Washington Bureau

BETHESDA, Md. — Ivan Guzman de Rojas may have found a way to keep Aymara, a 4,000-year-old language, alive and useful. To Guzman, a Bolivian computer scientist, Aymara is not just a beloved language spoken in the Bolivian and Peruvian highlands, but a computer algorithm that may be the missing link needed to develop multilingual translation systems.

Guzman explained in a recent interview here that Aymara has a syntax so rigidly structured, logical and unambiguous that its syntactic rules are never broken.

Consequently, he said, the syntax

is easily transformed into a computer algorithm, which in turn can be used to translate one language into others.

The Aymara algorithm is used as a "bridge language" for the translation system, so that the language of the original document is transformed into Aymara and then into any number of other languages. For example, the prototype system Guzman is demonstrating in this country translates Spanish to German, English, French and Portuguese, simultaneously rather than in series.



Guzman

"Any sentence in any language can be translated into another," Guzman said of his technique. If it can be perfected and marketed, it would become the first multilingual rather than bilingual computer translation system, he added. Guzman acknowledged that use of an intermediate language appears less efficient than direct computer translation, but he said the direct systems now in use are far from perfect. Direct systems, which translate word by word, typically require translators to do editing after the

computer translation to correct word order and syntax errors, he said.

Translation clusters of words

His system, on the other hand, translates clusters of words and uses a syntactic approach to place words in their proper order in the target language. Guzman developed the prototype system — called Atamiri, the Aymara word for interpreter — as a hobby in La Paz, Bolivia.

Edubated as a mathematician, Guzman said he discovered the algorithmic properties of Aymara about seven years ago when he used Aymara to teach mathematics to children. Then, working nights and weekends on a borrowed Wang Laboratories, Inc. VSS6 supermini, Guzman developed the translation system.

Atamiri needs more work, including software debugging and the addition of more lexicons, before it is fully operational and ready for marketing, Guzman said.

But the technique already has attracted the interest of the Organization of American States (OAS), which invited him to Washington, D.C., to demonstrate Atamiri to OAS translators this month.

In addition, Wang's research and development staff is taking Guzman's work seriously. E. Kirt Swann Jr., branch manager of Wang's Federal Systems Division, said Atamiri ultimately could be marketed to the many international and government organizations in the Washington, D.C., area that need multilingual translation systems.

Infomatics '85 set for Oct. 21

AMSTERDAM — Informatics '85, the annual conference and exhibition of the International Information Management Congress (IMC) that focuses on the latest technology and applications for document-based systems, is scheduled to be held here Oct. 21-24.

To be conducted at the RAI International Exhibition and Congress Centre, the conference is expected to attract users and vendors of document systems from Europe and many other parts of the world.

Topics to be covered include automation and records management; optical disk systems; productivity in the office; small-office microfilm systems; computer-assisted retrieval; software considerations; equipment selection criteria; interfacing technology; and banking and finance, government, engineering and medical applications.

Micrographics, word processing, communications, duplicating, data processing and other information management systems components and software will be displayed at the conference.

The full conference registration fee is \$400; the basic registration, not including luncheon, is \$300; and the one-day registration fee is \$180, according to the sponsor.

More information is available from IMC, P.O. Box 34404, Bethesda, Md. 20817.



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WESTWOOD
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A DEC engineer reviews baseplate design.

NEWS

DEC's Cimlab facility tests CIM products

By Edward Warner
CW Staff

SHIRESBURY, Mass. — A laboratory for the development and testing of computer-integrated manufacturing (CIM) products was opened here last month by Digital Equipment Corp.

The facility, Cimlab 1, consists of a computer-aided design (CAD) center and an adjacent model machine shop. The lab, according to a DEC spokesman, will be used to develop CIM systems for sale or for use within the company.

A second Cimlab will reportedly open in West Germany later this year.

"Cimlabs allow us to reproduce the heterogeneous environment needed to test real CIM solutions," CIM marketing manager Jack Conaway said. "Through this program, we intend to be the No. 1 worldwide supplier of CIM solutions."

Baseway used for transfers

Among the systems on display at Cimlab 1 was DEC's Baseway communications software, in use to transfer instructions from CAD terminals to computer numerically controlled (CNC) machine tools in the model shop. Using Baseway, the VAX series minicomputers of the CAD system downloaded designs to the CNC machinery and received production information in return.

Baseway was linked to the machine shop via a Xerox Corp. Ethernet local-area network, the orange cables for which ran to nearly all of the shop's intelligent machine tools and programmable conveyor belts.

The Cimlab 1 design room also featured several CAD terminals, solid and wire modeling and a DEC Professional 350 personal computer, running project management and financial analysis software.

Several of the engineering workstations in the room were connected to DEC's electronic mail system, which reportedly can transmit messages or drawings to DEC facilities worldwide. Electronic mail and financial analysis functions were included in Cimlab 1, according to DEC's Peter Smith, because "administration tools have to be integrated into the CIM approach." Smith is vice-president of DEC's computer-aided engineering and manufacturing products group.

Cimlab 1 is located at DEC's mass storage devices manufacturing facility, a part of DEC's Northeast Technology Center, and reportedly uses the center's model machine shop and members of its staff.

The storage devices manufacturing facility and other DEC plants will use Cimlab 1 as a living laboratory for their own CIM applications, according to a DEC spokesman.

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INTEGRAL SYSTEM, INC.

Tests find low anxiety rate of Cobol programmers

By Dennis Hahnemann
Chief

KIRKWOOD, Mo. — Cobol programmers have very low anxiety levels, according to the results of tests performed on 106 data processing students here.

The battery of 10 tests showed that there is a correlation between certain personality traits and success in Cobol programming or systems analysis, said Dennis Guster, assistant professor of data processing at the St. Louis Community College at Merriam, who administered standardized tests and followed up on 58 of the tested students after they graduated and found jobs.

According to Guster's research, Cobol programmers tend to exhibit the following traits:

- Low anxiety levels.
- The ability to find figures hidden in a field easily.
- A knack for finding the disarranging of flowcharts to be easy.
- A good attitude toward system design.

Recognizing assumptions

Systems analysts, on the other hand, have better luck at recognizing assumptions, Guster said. The only attribute that Guster has been able to find in common for both groups is ease in diagramming, he said.

Guster and a Cobol instructor at the community college realized that people who did well in Cobol courses did not necessarily do well in systems. They decided that it would be valuable for colleges and businesses to be able to identify distinguishing characteristics of the two job categories, he said.

Guster and his colleague on the

testing project — Jim Svaglic, a research assistant at St. Louis University — chose 106 students from two courses of study at the community college, he said. Some were from a two-year associate's degree program in data processing and others came from a one-year data processing program that carried the same core of DP subjects as the associate's program but did not have any other requirements.

The courses in both programs consisted of an introduction to DP, logical methods, computer concepts, two semesters of Cobol, two semesters of systems analysis and design, RPG programming and electives such as data base management or job control

language, Guster said.

Guster and Svaglic did a statistical analysis and obtained four variables related to programming ability and two related to systems analysis ability. Guster validated those particular findings by doing a follow-up study.

Predictions came true

So far, the programmers and analysts who have been recruited by the team have been true to the predictions, he added.


The team used SPSS, Inc.'s Statistical Package for the Social Sciences on the school's IBM 4381 running under IBM's DOS/VSE operating system to study the data.

The tests included "A Scale to

Measure Attitudes Toward Any School Subject" by the Purdue Research Foundation; the "Group Embedded Figures Test" by Consulting Psychologists Press of Palo Alto, Calif., and a subset of that instrument called the "Test Anxiety Inventory," including the "Reactions Subtest of the Test Anxiety Inventory"; the "Walton-Glaser Critical Thinking Appraisal," by Harcourt Brace Jovanovich, Inc.; and the "Computer Programmer Aptitude Battery" by Science Research Associates, Inc.

Guster said he hopes to find more traits that would distinguish systems analysts by eventually performing another study with different standardized tests, he said.

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DPMA show set for March 28-29

BLOOMINGTON, Minn. — The Northwest Computer Show, sponsored by the Northwest Chapter of the Data Processing Management Association (DPMA), is scheduled for March 28-29 at the Radisson South Hotel here.

More than 100 hardware and software suppliers, including IBM, Digital Equipment Corp. and Wang Laboratories, Inc., are scheduled to exhibit their wares at the show, the sponsor said.

The Northwest Chapter of the DPMA, which is composed of the Minnesota chapters of the DPMA, the Association for Systems Management and the Association for Computing Machinery, plans to hold four two-day seminars. The seminars will discuss management, personal growth, technical issues and future developments.

For preregistrants, there is no charge for attending the computer show. Registration at the door will cost \$5.

Each two-day seminar costs DPMA members \$195 and nonmembers \$210.

More information can be obtained from Sheri Hotzler, Glencoe Systems, Inc., Suite 880, 6300 Norman Center Drive, Bloomington, Minn. 55437.

NEWS

MIS overhaul anchors shipping firm in changing waters

MELBOURNE, Australia — A ship filled to capacity pulls into Melbourne harbor as longshoremen wait on the dock to unload cargo from Japan, Manila and Hong Kong. The vessel is one of 33 operated by the Australian National Line (ANL), the semigovernmental trading entity of the Australian Shipping Commission. The ANL also provides the only sea passenger service between Tasmania and mainland Australia.

Faced with sweeping economic and technological changes in the shipping industry, ANL conducted an organizational review in 1982 to determine how it could become more competitive in the commercial marketplace. One key recommendation

was to put financial accountability at the level of line management — a recommendation that entailed a complete overhaul of ANL's management information systems.

Restructuring MIS operations for a \$400 million business was a tough task, made more difficult by tight deadlines, according to Douglas Geekie, ANL general manager of finance. "But ANL had no alternative," Geekie said. "Without an effective management information system, we would lose money and jeopardize the organization's future," he summarized.

So, in the course of 12 months, Geekie's staff and a management consulting firm went to work evaluating,

installing and implementing the General Ledger (GL) system from Management Science America, Inc. (MSA) of Atlanta. The firm went live on schedule — July 1, 1984.

ANL's computer system is based on Fujitsu Ltd.'s Pacom M180 II with 128K bytes of main memory and 8.66 bytes of disk storage. Three tape drives and two 1,200 line/min printers make up the balance of the central site configuration. ANL runs GL under the Pacom X8 environment.

Network of 150 terminals

A network of nearly 150 terminals nationwide will give remote-site users access to the new system for data entry and inquiry, Geekie explained.

"We'll have GL capability wherever there's a DP hookup," he noted.

Implementation at ANL are MSA's accounts receivable and forecasting/modeling systems, which will run on a Pacom M180 II AD installed at ANL corporate headquarters here. When the accounts receivable system is up and running later in the year, all ANL operations will have access to full customer account details as well.

Historically, management information for ANL's five divisions was centralized and supported by an internally developed batch system. With the previous system, the general ledger was kept open three weeks after the month's end.

"With our new on-line system, we expect to close off no later than four or five days after the end of the month," said Ken Board, project accountant officer and a member of the implementation team. "The general ledger can be updated daily and will modify other applications."

Under ANL's new structure, each department within the five divisions has its own controller. For example, the operations department is responsible for ships, terminals and freight containers. Therefore, the marine manager, the ports and terminals manager and the container manager each has a controller maintaining ledgers and providing management reports.

'Masters of their own destinies'

"This structure lets line accountants become masters of their own destinies," Geekie said. "Their financial information can be tailored specifically for their responsibilities and activities."

To help implement the MSA system, a training program was developed by the ANL implementation team to introduce the system's capabilities to more than 200 management and staff employees. The culmination of the training program was a weekend course for accounting staff members, who learned about on-line tools that would allow them to define their own reporting requirements directly to the system.

According to Frank Dixon, DP communications manager, these on-line tools are a key benefit of the on-line package. "The flexibility in this system lets us produce reports in a style to suit every manager," he said. "You can't underestimate the importance of this, given the new accountability at the line management level."

Redefinition of chart of accounts

Going on-line with a new system meant that ANL had to redefine its chart of accounts to accommodate a responsibility-based accounting and management information system. At least 16,000 accounts — the function of voyages and legs of voyages — can be operative in a year, Geekie said.

ANL's accounts payable system, with a transaction volume of nearly \$25 million a month, has been modified to interface with the MSA package. ANL's existing invoicing software will be modified to interface with the MSA Accounts Receivable System.

"We'll have far better credit information now because the accounts receivable package is a full credit management facility," Geekie concluded.

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Q. WHY ALL THE TALK ABOUT LOCAL AREA NETWORKS?

- A.** There's been a lot written about Local Area Networks (LANs). What's all the talk about? Why are LANs important? Should your company be looking into them? Is one kind of LAN better than another? The fact is, a lot of people, ourselves included, think LANs are going to play a key role in the total telecommunications picture for most businesses. Here are some questions and answers that might help you better understand LANs.

Q. To begin with, just what exactly is a Local Area Network (LAN)?

- A.** It's a system for moving information between devices located on the same premises. Now that calls for some further definitions. By "information" we mean data, voice, text, graphics or images. By "devices," we mean big computers, personal computers or other workstations, printers, telephones, cameras, files, sensors and networks, and PBXs. By "same premises," we mean office building, manufacturing plant, hospital, campus or other geographically confined area. In short, and quite simplified, a LAN is one way of connecting all these devices to each other.

Q. There seems to be a number of different kinds of LANs. Why the variety?

- A.** The reason there are different LANs is because different work situations have different needs and different cost considerations. For instance, one type of network is capable of linking different kinds of computers, workstations and other devices throughout a building or campus. This allows for the exchange of information and the sharing of resources and large data bases. Then there's a need for a network specifically designed to interconnect personal computers. There's also the need for a special "industrial" LAN to meet the unique requirements of manufacturing plants. And there may be other networks developed to meet other needs.

Q. What if I want to link all the devices in my building?

- A.** IBM is developing a way to get all the devices in a building to communicate with each other using established computer and communications architectures. This will allow the main-frame computer, company-wide systems, smaller departmental clusters and even individual workstations to interact and share files, applications and peripherals.

We believe this general purpose LAN, utilizing "token-ring" technology, will provide the greatest flexibility and connectivity for different departments, workstations and systems. Other major benefits of this LAN technology will be very high reliability, predictability of performance, and greater overall network management capability.

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Q. Suppose I only need to connect personal computers?

- A.** We recently announced an IBM PC Network that allows a department, small company or remote location to interconnect IBM Personal Computers. This low-cost network lets PC users share files and printers, and send messages from one PC to another. The PC Network also lets users execute application programs and data bases in larger IBM System/370 computers.

Q. What about a LAN for manufacturing plants?

- A.** We intend to offer an industrial LAN which will allow factory floor data collection and interconnection of robotic systems, machine tools, numerical processors and industrial computers.

Q. And if I wanted, could I connect these different networks to each other?

- A.** IBM has announced that its planned token-ring LAN will also act as a "backbone" connecting these different networks. Each network will have the ability to communicate with IBM System/370 host computers and applications.

Q. What if I'm still not sure which way to go?

- A.** Choosing a LAN is a business decision that will vary from company to company, and from department to department. Remember that LANs are just a portion of your company's overall information solution—a solution that should be developed in a planned, structured and manageable way. If you'd like some help in figuring out the answer that will best suit your needs today and in the future, call IBM.

There's a lot more to be said about LANs and telecommunications. If you'd like a free copy of "Positioning Local Area Networks," call 1-800-IBM-5400, Ext. 50, or contact the company.

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NEWS



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BRAZIL

RIO DE JANEIRO — Lotus Development Corp. has accused a Brazilian firm of piracy of Lotus' 1-2-3. Lotus charged that Computer School, a Sao Paulo, Brazil, company that organizes summer camps for children, made illegal copies and translations of Lotus' 1-2-3 spreadsheet software. The software manufacturer claimed that Computer School did not obtain the Lotus package in the proper manner — through the authorized distributor in Sao Paulo.

ENGLAND

LONDON — Wigglesworth, an insurance company based here, has introduced the first specialist insurance policy covering data loss. The coverage will protect insurers against data loss owing to malicious damage.

Wigglesworth director Andrew Paddick said the wording of the policy is comprehensive enough to include software bugs. Paddick said the base premium is 0.75% of the amount insured.

LONDON — Acorn Computers Ltd., microcomputer manufacturer for the British Broadcasting Corp., suspended its stock shares after significantly lowering its prices. The

dramatic drop sparked the Stock Exchange in England to investigate the situation. The collapse of the Acorn stock is being attributed to the company's attempt to enter the American market, a move that cost Acorn an estimated \$6.5 million.

FRANCE

PARIS — Groupe Bull, with France Cables et Radio, has begun trials of the actual Telecom 1 satellite after year-long tests using a simulator. The trials will examine the compatibility of Bull products with the digital links of Telecom 1, an apparatus that was launched last year by Postal Telephone and Telegraph authorities.

According to sources, Bull's Datatop 7101 net processor with a V.35

interface currently supports links at transmission speeds up to 64K bit/sec. As a result of the joint effort, the firms expect to boost speeds to 1M bit/sec using a X.21 interface in Datatop 7100.

JAPAN

TOKYO — Fujitsu Ltd. has reportedly penned an agreement with the Chinese Ministry of Post and Telecommunications to install three million lines of F-150 digital private branch exchanges (PBX). According to Fujitsu, the PBX will initially extend throughout 13 districts in China and will eventually include telephone and transmission units by the end of 1987. The pact contains plans for a maintenance center, a training center and a software service center.

SOVIET UNION

MOSCOW — The Soviet Union is reportedly negotiating with Western computer firms to buy thousands of microcomputers for use in secondary schools and scientific institutions. Companies said to be arranging contracts with the Soviets include IBM, ICL Co., Sinclair Research Inc. and Apple Computer, Inc.

Until Jan. 1, Western powers banned the sale of certain types of personal computers to the Soviet Union. The governments drew the line at advanced desktop micros such as IBM's Personal Computer AT and Apple's Macintosh.

WEST GERMANY

MUNICH — The West German foreign trade volume in the data processing sector increased an average of 76% between 1980 and 1983, reaching a new high of nearly \$5 billion. DP systems imports grew by 74% during that time period, with exports swelling to a record 77%. West German imports from Japan jumped 45% from 1980 to 1983, and DP imports from Third World nations rose 200% in 1982.

MUNICH — Nearly \$5 billion is spent each year in West Germany on training and continuing education. That figure is only about \$300 million more than what is spent each year on computer software, according to a study by SGS-Personalberatung, a personnel consulting agency in Hamburg, West Germany.

The SGS-Personalberatung study revealed that approximately 25% of West German firms spend in excess of \$500,000/year on data processing training — a skill in great demand in that country. Data processing constitutes 90% of technical education, making it the largest single training priority.



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NEWS

Minis broaden bank's service offerings

'Flexibility' called key to custom applications

WILMINGTON, Del. — Delaware Trust Co. here claims to have gotten an edge on its competitors by offering such services as real estate listings, class action lawsuit processing and investment custody programs.

Those services are possible, a bank officer said, because of the firm's use of an in-house computer network built around two Hewlett-Packard Co. HP 3000 systems. The network at the 86-year-old bank was built up over roughly seven to eight years, starting with an IBM mainframe. The

bank moved upwards with IBM equipment, primarily using it to fill massive data storage needs, explained Mike Yacyk, vice-president and deputy controller.

The bank still uses IBM equipment — a 3081 mainframe is the top processor in its network hierarchy — but it has since made a strong move into minicomputers, first with an HP Series 2000 machine and, most recently, with two HP 3000 models.

"The HP 3000's flexibility and ease of use enabled us to develop a number of custom applications — like our investment custody program — that are usually found only on the biggest mainframe computers," said Rolf Erikson, who was an executive

with the bank at the time. Erikson has since left Delaware Trust.

To meet the growth in applications, the bank upgraded five years ago to an HP 3000 III, which ran a limited office automation package. That processor has since been designated for external use and now houses the bank's real estate listings. For internal use, the bank brought on line last year an HP 3000 Series 48 mini running an OA package.

Yacyk said the bank looked at other vendors when it decided to upgrade to something more than the HP 2000. The bank chose to stay with HP, he said, because of the software for the Series 3000 minis, particularly the development tools and HP's Image data base management system.

An additional factor in HP's favor, he added, was equipment reliability and the responsiveness of HP's support programs. "They come down in less than four hours," on a service call, he said. "They have a response line that calls back in a half hour."

Delaware Trust's hierarchical network has automated the bank's daily activities and enabled it to offer a variety of time-sharing services to professional organizations throughout Delaware and other states, said Yacyk, who replaced Erikson at the bank.

The bank's IBM 3081 mainframe has 4M bytes of memory and handles a number of large data bases, item processing and bulk check filing. The next level consists of the HP 3000 III, with 1M byte of memory, and the HP 3000 Series 48, with 4M bytes of memory.

At the bottom of the network are roughly 50 dumb terminals, 15 word processors, various peripherals and 16 microcomputers (HP Model 160s and IBM Personal Computers). The micros are tied into the system three ways: directly to the HP computers, directly to the IBM mainframe and, in some instances, to both.

Yacyk said the HP 3000s process most of the information on the network. The two are connected to the mainframe via direct line, EJE and tape to tape. The network allows the bank to handle custom programming, get into large data bases and produce reports.

Library of applications

The bank has developed a library of applications for the HP 3000s, many of which were written for in-house banking applications. Other specialized packages have been developed to allow the bank to offer services to a variety of professional groups.

Most of the bank's OA tasks are handled by the Series 48 mini, using HP's OA software package, Yacyk said. The bank's word processing requirements, which cover everything from memos to 200-page documents, are handled by HP Word. HP List Keeper maintains customer mailing lists and histories and, when working with HP Word, lets the user create a list and merge it with a letter or document. HP Desk Manager is employed in several areas of the bank to communicate programming requests to the computer system, to develop schedules and to send electronic mail back and forth between employees.

In-house programs were devel-

See BANK page 43

An HP 3000-based not automates Delaware Trust Co.'s daily activities.



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NEWS



CALL FOR PAPERS

NORTH AMERICAN DATA GENERAL USERS GROUP CONFERENCE
Boston, Aug. 26-28

Topics for conference papers could include unique concepts, new discoveries or special knowledge in the areas of computer technology, management, marketing or other business areas. Other topics will also be considered based on their importance to Data General Corp. users.

Presentations will be selected solely on the basis of an abstract of the paper, due April 28. The preliminary agenda will be set by May 13, and preliminary will be notified of their acceptance by mail. Call for papers applications for both prospective presenters and exhibitors are available from North American Data General Users Group, c/o DG, 4400

Computer Drive, Westboro, Mass. 01580.

THE SOCIETY FOR INFORMATION MANAGEMENT'S (SIM) 1985 AWARDS PAPER COMPETITION
Boston, September 1985

SIM sponsors the annual competition to recognize outstanding work by seminar managers in the areas of information management and information systems.

Papers must describe a management information system, an approach to developing information systems, a technique for improving MIS activity or the management of MIS activity; the work described must be implemented and must have been evaluated and judged to have a significant impact on the organization involved. The primary author should be a manager of the institution in which the work was implemented.

The work must address top management issues — the impact, the system support of top management decision making, the timely/effective presentation of information to top management and so on. Papers need to define clearly a conceptual and

managerial context in which to view the work.

Abstracts should be submitted to E. Nancy Markin, Vice-President for Information Services, Federal National Mortgage Association, 3900 Wisconsin Ave., N.W., Washington, D.C. 20016.

THE 42ND CONFERENCE AND CONGRESS OF THE INTERNATIONAL FEDERATION FOR DOCUMENTATION
Montreal, Sept. 14-18

Papers are now being accepted for this conference. Proposed topics should include new techniques for information handling and information transfer, advances in communications systems, advances in computer systems, electronic publishing, electronic document delivery systems and all aspects of technology transfer. The conference languages will be English and French.

Authors are requested to submit six copies of a summary of a proposed paper to the conference chairman, Mr. E. V. Smith, Director, Canada Institute for Scientific and Technical Information, National Research Council of Canada, Ottawa, Ont., Canada K1A 0S2. Deadline date is June 30.

BANK from page 42

oped to meet the bank's specialized requirements in the areas of graphics and spreadsheets, Yacyk said.

The bank also offers applications for outside firms, such as a class action processing service that takes over the clerical duties involved in that kind of suit. The bank also offers a large local law firm's customized program that will eventually be offered to the rest of Delaware's legal community. Like the class action application, this one provides many of the daily, clerical needs of running a

law firm. Delaware Trust handles all of the law firm's client accounting, storing case histories, updating files, tracking cases in progress and processing billable hourly activity.

The bank's real estate listing service is utilized by more than 100 real estate offices in Delaware and in parts of Pennsylvania and Maryland.

Overall, Yacyk said, the bank is pleased with its HP 3000s, so pleased that it is considering the purchase of a third HP 3000 to meet increases in demand and the needs of a planned automated credit card application processing system.

Interface '85 slated for March 4-7

ATLANTA — "Coping in the New Environment" will be the theme of the Interface '85 conference to be held at the Georgia World Congress Center March 4-7.

Sessions at the conference will include discussions of strategies in the wake of the AT&T divestiture and, in the area of personal computer proliferation, the impact of new technologies on information management, the

shifting roles of information managers, the network-to-network interconnect challenge, user case studies, digital modernization of analog facilities, local-area networks, office systems integration, surveys of hardware categories and data communications software.

Information is available from Interface '85, 300 First Ave., Needham, Mass. 02194.

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INFORMATION SERVICES

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NEWS

Firm's explosive growth demands system upgrade

ATLANTA — Faced with a spiraling annual growth rate, an insurance underwriting company here found itself in the midst of a processing problem.

At Southern Insurance Underwriters, Inc. (SIU), growth in specialty risk insurance put a crimp in the company's computer facilities.

SIU first computerized in 1976 with Digital Equipment Corp. PDP-11 equipment. Two years later that system was outgrown, according to Stephen Gentilozzi, data processing manager. Gentilozzi said that in mid-1978, SIU purchased a Nixdorf Computer Co. Model 640 minicomputer and four data entry terminals. During the next six years, a Nixdorf 655

and several disk drives, terminals and printers were added to the system.

"In 1980, we transferred our personal automobile and [Southern Insurance Underwriters Premium] business to the 655," said Wes Duesenberg Jr., executive vice-president. The 640 was still used for other functions, including maintenance of statistical data to the generation of brokerage reports. "It wasn't too long before our systems were filled to capacity," he said.

According to Gentilozzi, another upgrade was needed in 1983. "At the rate we were growing we could have added four more disk drives and two additional 600s, and even that would

have been only a stopgap measure," he said. "Processing time was increasing, we were running three shifts, and we constantly purged data because we could only store three months' worth at a time. We needed the capability of storing data for a year. We also needed the horsepower of a mainframe to perform number crunching at night and produce paper at a fast rate of speed during the day. And most importantly, we needed an expandable system for the future."

IBM's 4331 and Nixdorf's 8890 were the two systems considered best suited to fill SIU's needs for speed, flexibility, power and expandability. "Nixdorf's price was a bit

lower than IBM's, so we went back to IBM and asked if they could be more competitive," Duesenberg recalled. "Well, they lowered the price, but they also reduced the power of the system." Nixdorf made no hardware alterations and offered classroom training time, support and Nides/VSE, its IBM-compatible operating system, he said.

But other factors, including disk configuration and system expandability influenced SIU's final decision. "IBM was proposing a fixed-disk configuration because it couldn't offer us the multiple-disk structure, which in the long run would provide unlimited storage simply by changing packs," Gentilozzi said. "Furthermore, if you run into a problem on a fixed disk, it just sits there, along with all your programs and data. If that drive goes down your system is down. However, with the 8890 we could take three drives off the line, and still operate." In addition, the

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Gentilozzi (l), with Reid Bohring, at the Nixdorf Computer Co. 8890.

4331 was a 1M-byte machine. "In order to upgrade to 2M bytes of memory we would have had to go to the next size machine, which would have involved the added expense of changing the entire CPU," he said. The Nixdorf 8890 provided the ability to upgrade by three generations, Gentilozzi said.

SIU's data processing department is now using a Nixdorf 8890 configured with 2M bytes of memory, four 200M-byte disk drives, a single Model 9/16 tape drive, nine terminals and an IBM byte channel patched to a laser printer. The company also uses the Nixdorf 640 with three 65M-byte disk drives and the Nixdorf 655 with four disk drives. The 600 series systems share 32 duplexed terminals, two line printers and seven terminal printers.

Sixty to 70 pounds of mail are received daily from producers in the field. These independent agent submittals are comprised primarily of requests for insurance of new policies and requests to change or cancel existing policies. The volume of new automobile application acknowledgments alone averages 800 to 400 per day, with peaks in excess of 1,000 daily. Busy periods occur just prior to tag time, the deadline date when all Georgians must renew their auto license tags. Other peaks are in the spring when the volume of trailer, motorcycle and boat license renewals increases. This inflow is opened, stamped with the date and sorted by See B31 page 46

NEWS

Regrouped DP boosts baby wear maker's production

GREENVILLE, S.C. — Infant and toddler clothes constitute a highly competitive area of the garment industry, and a relatively young company, based here, is grabbing an adult-size share of this specialized business due, in part, to the consolidation of its computer-based production procedures.

Since its launch in 1976, Kent, Inc. has positioned itself to be a power in the infant sleepwear and playwear trade. Sales last year topped \$18 million, double what they were only four years ago.

A large part of Kent's success was attributed to on-line computer communications between its headquarters here and its three manufacturing

plants located in Port Kent, Maine; Liberty, S.C.; and Ballinger, Texas, according to company officials. Production procedures are scheduled by the computer to help smooth the manufacturing cycle.

The company runs an NCR Corp. NCR 1-9040

mainframe at its headquarters. That computer is linked by 4.8K bit/sec dedicated phone lines and Digital Controls Corp. 6001 statistical multiplexers to NCR data display terminals and printers at its Port Kent and Ballinger plants, while facturing cycle.

2.4K bit/sec modems are used to hook up a New York sales office and the Liberty plant's terminals and printers to the mainframe.

The Port Kent facility produces 5,000 dozen sleepwear and playwear knit sets per week and 150,000 dozen blanket sleepers per year, the Liberty plant produces 4,000 dozen knit sets a week, and the Ballinger plant manufactures 115,000 blanket sleepers each year. Production at all three plants is scheduled and monitored by the computer at its headquarters.

When the company started out with 50 people working in a previously abandoned Maine factory, Kent installed an NCR 1-9020 computer minicomputer at its Port Kent plant; it later added another 1-9020 in its Greenville headquarters.

"We started with the 1-9020 system at our Maine plant and a printer and terminal at headquarters, but that system got a little cumbersome," said Ernie Maness, vice-president, administrative sales at

Kent. He noted that sales orders and invoices were handled at the Maine facility, even though the accountants were in Greenville. "The reports were always late," he said, adding that the tendency of the Maine staff was to put priority on production ap-

plications rather than month-end reports. By the end of 1978, the company installed a second 1-9020 system at its headquarters, which was used to batch process orders arriving via the Maine office computer system. "Batch processing between the two computers

wasn't working," Maness noted. "The biggest problem seems to have been coordination. We had files here in South Carolina and in Maine, and supposedly they were identical. We would enter orders at the end of each day and send them over phone lines to Maine, where files were supposedly updated. At the same time, Maine would do its invoicing and send that information to us at the end of the day."

When the company opened its Liberty plant, order information was prepared in Greenville and sent to the computer in Maine for its operation, and orders for the Liberty plant were printed in headquarters and dropped off each day at the Liberty plant manager's home.

The decision to pull all accounts payable and general ledger into the Greenville office helped tremendously, but the two computer systems did not work out well, Maness said.

Kent then opted to install a single system. They put the 1-9040 at head-

quarters and three display terminals and a 300 line/min printer in Maine.

"We now have control of all files here in Greenville. Before, people at one place didn't know what was happening at the other plant at any given point in time. Today, we all know what's going on at other plants, and we know it right now," Maness said.

Since the system was installed, the Ballinger plant has been equipped with two terminals and a printer, and the Liberty plant has a terminal and printer.

Maness, in addition to being a vice-president, is the resident programmer, and he prepared Kent's applications software by making major changes to a customized payroll package.

Order entry is one task handled by the system. Orders are generated by salespeople with paper copies for key entry. The computer system then generates packing lists for each plant. The lists are used to schedule production runs and to generate shipping labels.

The order entry information is used to generate invoices. Inventory reports and sales analyses are produced weekly and monthly. Accounts payable and general ledger are on the system, as are production reports and payroll.

The toughest task, Maness said, was to integrate a piece-rate payroll. "We needed something that would track and enter the daily tickets, from which individuals are paid," he explained, adding that the computer-generated tickets carry the piece rate for each bundle of pieces that are sewn together to make a garment. The worker's pay is determined by the number of tickets and the rate on each ticket.

In addition to figuring pay on piece rates, Kent's software package gives management a daily report on what each individual in each department has done each day, along with

See KENT page 46

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PROFESSIONALISM
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The Institute for Certification of Computer Professionals (ICCP) has scheduled the first of two 1985 sittings for the Certificate in Data Processing (CDP) and Certificate in Computer Programming (CCP) for May 11, 1985, at test centers throughout the world.

The CDP Examination is designed for business-oriented DP practitioners at the management or supervisory level. The CCP Examination for experienced programmers is conceived so that each area of specialization—business, scientific, systems programming—includes five general computer programming

sections and a sixth section in candidate's area.

Application Deadline is April 8, 1985 for May 11, 1985 exams.

NOTICE

This is the last year you can sit for the CDP and CCP without recertifying. In 1986, successful candidates will be required to recertify every three years!

For a copy of either the CDP or CCP 1985 Examination Announcement and Application Form, check the appropriate box below. The brochure includes an Application Form, Test Site List, Exam Content and Outline of Topics, Conduct and Good Practice.

☐ CDP ☐ CCP

Official Study Guides for both the CDP and CCP exams are available. Study Guides may be purchased directly from the ICCP Examination Office: 2910 East Devon Ave., Suite 268, Des Plaines, IL 60018. Make checks payable to ICCP.

☐ CDP Study Guide \$12.50 per copy plus \$1.50 postage/handling
☐ CCP Study Guide \$12.50 per copy plus \$1.50 postage/handling

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NEWS



On-line at SIU

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department. Checks are deposited, and new policy requests are reviewed to determine whether or not they represent acceptable risks. Acceptable risk application data are entered into the system at a terminal. Keyed information includes a six-digit producer number, the date received and the insured's name.

Edits checks during data entry

During data entry, a variety of edit checks are conducted. These are designed to reduce the probability of potential errors during the policy issuance stage.

"We verify producer's name and address, and the computer automatically reads the input codes and adds the total coverage," West explained. "If a customer is only supposed to re-

ceive \$100,000 coverage plus \$250 deductible on their comprehensive, the system double-checks the balances to ensure that what was requested matches what was input. All state regulations have been incorporated into the software."

Differences between rates and coverages that the producer requests and what the computer calculates are electronically flagged. Appropriate letters to the producers explaining the discrepancies and requesting relevant action are automatically printed.

Integration streamlines "fancy things"

"Our system does many fancy things because it is integrated," Gentilozzi said. "At the time we key in policy information, we order a motor vehicle report from the state. The application is then compared to the

driver's record to determine insurance rates."

Another benefit of the integrated software architecture is realized in the financing. "After the system tallies the premium totals and performs edit checks — most of which agree with the input — the screen prompts the operator with financing questions," Duenenberg said.

The system sets up a premium financing schedule, generates an invoice, an identification card and a series of premium finance acknowledgment coupons.

The turnaround between receipt of an insurance application and the issuance of a policy has been significantly streamlined.

"Our response time is now down to two weeks, and we're aiming to trim that [further] to seven days," Duenenberg said.

Realia COBOL. Migration without migraines.

Until recently, you had to abandon the business computer language when you developed micro-computer application software. The available micro COBOLs were inadequate—too limited, too slow. The best alternative—the XT/370 or AT/370 using IBM's COBOL—was very expensive and still too slow. To get acceptable performance, you had to retrain your programmers in Pascal or C.

Realia COBOL is the cure for such headaches.

Realia's compiler supports most IBM VS/COBOL and VS/COBOL II features, such as:

- COMP and COMP-3 data
- SELECT assignment names
- Multiple entry points
- GOBACK, EJECT, and SKIP statements
- Structured programming extensions of VS/COBOL II

You can download mainframe systems for development, maintenance, and testing. Productivity will soar.

You can compile faster with Realia COBOL than in most mainframe environments, even on floppy-based systems. Compile-time options allow cross-reference, brief and full code listings, and helpful features like subscript and decimal value checks.

Our interactive debugger lets you follow the program source, display and modify data, and set breakpoints using the normal optimized machine code.

The results are startling.

Our users report that their systems run up to 20 times faster when compiled by Realia COBOL. That's compared to our nearest micro competitor. The ratio is up to 100 times faster when compared to any of the others.

On the IBM PC AT, your programs can run at 370/148 to 370/158 speed. Realia's file system really makes your machine deliver, giving it a distinct edge over Pascal or C. Our indexed file system even has full key compression and buffer controls just like VSAM. The generated code is pure MS-DOS, so it can be run on most of the 8088/8086 machine family.

And you can sell your programs without paying us a royalty fee.

Realia COBOL is priced at \$995, including one year of maintenance and upgrades. Subsequent maintenance and upgrade contracts are currently priced at \$125/year/copy. Available for the IBM PC, PC XT, 3270 PC, PC AT, PC-compatibles, and the TANDY 2000.

Realia COBOL. What a relief.

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Seminar to eye local networks in factories

CHICAGO — The Yankee Group has scheduled "Data Communications in the Factory," a seminar that will examine how manufacturing companies can use local-area networks, for March 12 and 13 at the Westin Hotel here.

The conference will discuss topics such as alternatives to the General Motors Corp. Manufacturing Automation Protocol, the future of proprietary networks and the implementation of today's communications technology.

Other scheduled items include wiring issues, networking in process control and linking plantwide and corporate networks, the Yankee Group said.

For one person attending the conference, the registration fee is \$875; each additional person from one company can attend for \$775.

The Yankee Group is located at 14th Floor, 89 Broad St., Boston, Mass. 02110.

KENT

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week-to-date totals. Those reports indicate whether a worker is earning approximately the minimum wage.

Tracking inventory and orders

According to Maness, the 19-040 also tracks inventory and orders.

"We run reports weekly that show our open orders, our style status and how many dozen garments we have cut against our orders for those garments," he explained.

"If we have orders for 1,000 dozen, and we've cut 800 dozen, we're 200 dozen behind. Because we produce a report that gives a shipping schedule, we'll be OK if those 200 dozen aren't due for four months. However, the program would flag a problem if we were within four weeks of delivery," he added.

Maness observed that in the textile industry it is important to keep inventory to a minimum. He concluded, "There is simply no way we could keep our inventories down and our production smooth without this system."

NEWS



YUMMIDAYS
Lary Long

Q I know for a fact that personal computers in my department have been used for the unauthorized duplication of proprietary software. Recently, I made it clear that I did not condone this type of activity. However, I learned through the grapevine that since that meeting, one package has been copied for home use. Have other companies been successful in stopping software piracy? If so, how?

Every time I begin to think that the software pirates are losing the war, I am reminded that the pilferage continues. Only recently, I listened as the president of a company (perhaps \$30 million in sales) encouraged more than 100 conference attendees to save money by copying proprietary software. Software vendors are very serious about eradicating this erosion of profits.

Any company that does not have a written policy regarding the duplication of proprietary software should draft one as soon as possible. For the purpose of individual protection, any manager responsible for microcomputers should distribute a memo that articulates the company's policy on the reproduction of proprietary software.

As further protection for the company and as a warning to users, many companies are producing stick-on labels that read something like this: Unauthorized duplication of copyright software is prohibited on this machine.

Q A few years ago, I took over our family-owned savings and loan business. I managed our computer center for five years during the 1970s and only recently have become aware of how miserable we are as computer crime. Are there any elements that inhibit the possibility of a computer crime?

Computer crimes occur methodically over a long period of time. Any physical or behavioral change may be so gradual that it may go undetected. The best way to thwart computer crime is to take precautionary measures. Do this by conducting very thorough risk assess-

ment. Long, president of Long and Associates, is a consultant, lecturer and author in the field of information services. If you have a question you'd like him to address, send it to Lary Long, Editorial Department, Computerworld, P.O. Box 380, 178 Chestnut Road, Framingham, Mass. 01701.

ments each year.

I encourage both MIS and user managers to get more involved technically in the work of their subordinates. Ask detailed questions of subordinates, even if they do not fully understand the answers. The rationale behind this is that subordinates are given the impression that management is right on top of what they are doing. This perception may be just enough to dispel any thoughts of "fast money."

Q Two years ago, I decided to quit working as a computer operator and return to school and work toward an associate degree in data processing. During the three years I worked in operations, I learned I wanted to get out of operations and into programming.

I am currently attending a community college and am working toward two associate degrees — one in DP, the other in accounting.

From there, I want to pursue a four-year degree in computer science. I want my money to go into courses that will help me get into data base development work. What types of courses should I take and, specifically, what languages?

Two degrees at the same level may make you a more knowledgeable person, but the second degree has limited market value. If you know for sure that you are going to pursue a four-year degree,

pick a college now and make sure that there will be no problem in transferring your associate degree credits.

Most four-year computer science programs will require a data structures course and a theoretical data base course. Also, take an applied data base course in which you design and use a data base.

Courses in Pascal, C and assembler provide a good foundation for data base development.



Oh, the joys of being a DP professional.

Every job has its share of problems. But DP professionals seem to be blessed with more than their fair share.

We can help you do away with some of the grief and hassle. Things such as JCL errors, production feed-back, and network breakdowns.

Our **JCLCHECK** program spots "relief" from JCL problems. It catches all JCL errors, gives you complete, on-line error validation and concise diagnostics. Plus full documentation on a job stream, or even production system, suitable for insertion in the run book.

Our **ProdNet** program is the instant remedy for production headaches. It's an automatic, on-line dictionary of all your production jobs, data sets and programs, that can save

you the hours, days, even weeks now spent manually searching listings. It makes possible better scheduling, reliable contingency planning, and faster disaster recovery.

Our **NetCheck** program takes the pain out of taking control of your CICS network. It allows you to organize your network in manageable groups with easy-to-remember names. It enables you to bring up the network in just minutes. And troubleshoot problems in seconds. So things get done faster and easier, with you in control of your network, instead of vice versa.

For all the details on **JCLCHECK**, **ProdNet**, and **NetCheck** send the coupon, or call us at (408) 554-8121. We'll deliver fast, long-lasting relief.

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NEWS



MANAGING ON THE MOVE

implementation and maintenance of the management information systems required by all facets of the division.

He will also be responsible for the coordination and implementation of project management principles in all areas of the division.

Younger joined McCormick in 1967 as an industrial engineer and has held various positions within the corporation.

His assignments have included director of manufac-

turing for the Food Service Division, and since 1979, director of purchasing for the Grocery Products Division.

He graduated from Baltimore Polytechnic Institute in 1968 and received a bachelor's of science degree in industrial engineering from Johns Hopkins University in 1969.

McCormick & Co. is a Baltimore-based international producer of sausages, flavorings and specialty foods.

LIANE WILSON has joined Washington Mutual Savings Bank as senior vice-president and manager of data processing for the statewide financial institution. She will assume responsibility for data processing support to head office management and operations throughout the bank's 40-branch network.

Wilson comes to Washington Mutual after 10 years at Peoples National Bank in Seattle where she successively served as vice-president and

manager of data processing operations, programming, research and systems reliability.

Formerly, she was a staff programmer with IBM in San Jose, Calif., and Sperry Hutchinson Co. in New York.

RICHARD A. SCHLAGER has been promoted to vice-president of Computer Management Dynamics, Inc. in Middleboro, Mass. He will have overall responsibility for software implementation.

Lilly

MICHAEL J. LILLY has been promoted to director of management information systems operations of AMF, Inc. located in White Plains, N.Y.

In his new position, Lilly will be responsible for systems development for corporate headquarters and international trade operations, all corporate computer applications software and telex and telephone systems.

Prior to joining AMF, Lilly was manager of the corporate data center located in Westbury, N.Y.

Previously, he was a systems analyst with the Square D Co. in Milwaukee.

He joined AMF in 1975 as a software programmer with the AMF Harley-Davidson Motor Co. in Milwaukee.

In 1978, he was named manager of management information systems consulting project, at corporate headquarters in White Plains, and in 1982, he was promoted to manager of the corporate data center.

Lilly studied at the University of Wisconsin and the Milwaukee Institute of Technology majoring in business administration and accounting.

He is currently pursuing a bachelor's degree in management information systems/marketing at Western Connecticut University.

WILLIAM E. YOUNGER JR. has been appointed director of systems and project management for the Grocery Products Division of McCormick & Co., Inc. in Hunt Valley, Md.

He will be responsible for the evaluation, development,

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Schlagler holds a bachelor's degree from New Hampshire College in MIS.

MARTIN D. BOSCH has joined Allied Maintenance Corp. in New York and has been appointed assistant vice-president. He will be responsible for management information systems.

Bosch has worked for Sony Corp. of America as director of management information systems, and immediately prior to joining Allied,



Schlagler

he was with Iqco Corp. He has more than 20 years of experience in data processing as an educator and industry consultant.

Bosch possesses a certificate in data processing, a master's degree from Pennsylvania State University and a bachelor's degree from Brooklyn College.

RICHARD D. FRICK recently was named assistant director of information systems for the Chicago Tri-



Frick

bune. In his new position, Frick is responsible for all operational activities in information systems.

Frick was director of information services at Snap-On Tools Corp. in Kenosha, Wis., where he had been employed for 10 years. He also had spent nine years with the Advisory Management Services Division of Price Waterhouse & Co.

Frick holds a bachelor's degree and master's degree from Purdue University.

NAREN K. BAKSHI has been named director of information systems for TRW Inc.'s Industrial Products Group in Cleveland. In his new position, Bakshi will direct a function that is responsible for the administrative and functional leadership of all management information system activities for the group. He will also manage the centralized computer center located in Jamestown, New York.

He joined TRW in 1980 as manager of information systems on company staff. Two years prior to that, he was vice-president of information systems at Ameritrust Corp. Prior to that, he served seven years in various management systems positions at Standard Oil Co. in Ohio.

Bakshi received a bachelor's degree in industrial engineering from India's University of Ranchi. He also holds a master's degree in business administration in finance and marketing and a master's degree in science degree in operations research and computer sciences from the University of California at Berkeley.

TIM LUKEN has been appointed vice-president of management and business information systems for RCA Global Communications, Inc. in New York. Luken is responsible for RCA Global's internal management, information systems and office automation.

For the last two years, Luken was director of information systems and data processing operations.

He received a Ph.D. in mathematics from the Colorado School of Mines in 1973. He received a master's degree of education in psychology in 1969 as well as a bachelor's degree in mathematics in 1967, both from Xavier University.

YOUR TWO FAVORITE COMPUTERS NOW HAVE ONE THING IN COMMON. YOUR FAVORITE GRAPHICS TERMINAL.

Introducing the new CX4100 Series of Tektronix high performance, yet affordable color graphics terminals. Now you can have the Tektronix PLOT 10 graphics command set you've always wanted while you use the host of your choice, IBM or DEC. Just by typing a single

IBM-style keyboard. Plus Tek enhancements: individual key programmability, user-selectable ten-key pad, and joystick for quick cursor movement and graphics input.

Screen output will be just as familiar as keyboard layout. 32-line 3278/3279 alphanumeric emulation is built in. And so is full support for the 4957 Graphics Tablet, plus full hard copy and transparency output to a full range of Tektronix Color Graphics Copiers and the 4510 Color Graphics Rasterizer.

Full flexibility is matched by DEC flexibility. In RS-232 mode, the terminals can run all VT100 applications through the extended Alter XLIM command set. In addition to the host interface port that transmits data at rates up to 38.4k baud, CX terminals are provided with two additional RS-232 ports and a Centronics-style parallel port for connecting a wide range of peripherals.

But best of all you'll have great graphics and full software compatibility. The CX Series will accept many existing programs written for 4010, 4100, and 4110 Series terminals. And they're fully compatible with PLOT 10 GIL, GKS, and TICS programs as well as with popular third-party software such as SAS, GRAFTR, ISSCO's DESPLA® and TELL-A-GRAF® and Precision Visuals' DI-3000®.

Tek's all new precision ink jet 4952 color copier produces very high quality full color transparencies or hard copy.

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So don't wait. Set the best of three worlds on one desk: TEK, DEC, and IBM. Contact your local representative today for information on the CX4100 Series. Call 1-800-547-1512. In Oregon 1-800-452-1677.

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Familiar 3270 IBM-style alphanumeric output is fully emulated on all CX4100 terminals. Enhanced IBM-style keyboard is part of the package.

"switch-host" command. Tek's CX4100, CX4107 and CX4109 are all directly plug compatible with both host environments. One coax to a standard IBM 3270 controller is all you need or one RS-232 connection to your DEC system.

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NEWS



CALENDAR

WEEK OF MARCH 24

MARCH 24-27, SAN FRANCISCO — 1986 Annual Convention & Exposition of the Electronic Funds Transfer Association. Contact: Electronic Funds Transfer Association, P.O. Box 66300, Washington, D.C. 20035.

MARCH 24-27, ORLANDO, FLA. — Texas Instruments, Inc. Microcomputer Information Exchange 1986 International Computer Symposium. Contact: TI Microcomputer Information Exchange, M/S 2200,

P.O. Box 2009, Austin, Texas 78769.
MARCH 24-28, ARLINGTON, VA. — Institute of Electrical and Electronics Engineers (IEEE) Information '86. Contact: IEEE Infocom '86, P.O. Box 639, Silver Spring, Md. 20901.

MARCH 25, NEW YORK — CICS/VS Internals. Contact: On-Line Software International, Inc., Fort Lee Executive Park, Two Executive Drive, Fort Lee, N.J. 07024.

MARCH 25-28, MILWAUKEE — Managing Information Centers Effectively. Contact: Thomas Bisacchino, Association for Systems Management, 24557 Bagley Road, Cleveland, Ohio 44138.

MARCH 25-26, COLLEGE PARK, MD. — Inventory Control & Record Accuracy. Contact: Center of Adult Education, University of Maryland, College Park, Md. 20742.

MARCH 25-27, BOSTON — The Integrated Value/Data Private Branch Exchange: Architecture and Products. Contact: Technology Transfer Institute, 741 10th St., Santa Monica, Calif. 90402.

MARCH 25-27, BOSTON — Automating the Office: A Tutorial Guide for Success. Contact: American Management Association, 135 W. 50th St., New York, N.Y. 10020.

MARCH 25-27, WASHINGTON, D.C. — Introduction to Data Communications. Contact: Systems Technology Forum, 9000 Fern Park Drive, Burke, Va. 22015. Also being held March 25-27 in Boston.

MARCH 25-27, HOUSTON — Planning an EDP Disaster Recovery Program. Contact: Marjorie Glaser, Computer Security Institute, 45 Boston Post Road, Northboro, Mass. 01552.

MARCH 25-27, DALLAS — Testing Computer Software. Contact: U.S. Professional Development Institute, Testing Computer Software, 1820 Elton Road, Silver Spring, Md. 20903.

MARCH 25-27, NEW YORK — Data Communications: A Complete Overview and Update. Contact: Data-Tech Institute, P.O. Box 2429, Lakewood Plaza, Clifton, N.J. 07016.

MARCH 25-28, SAN ANTONIO — Vams: From Start to Finish. Contact: On-Line Software International, Inc., Two Executive Drive, Fort Lee Executive Park, Fort Lee, N.J. 07024. Also being held April 1-4 in San Antonio.

MARCH 25-28, FORT LEE, N.J. — IBM/BC (Data Communications) Programming. Contact: On-Line Software International, Inc., Two Executive Drive, Fort Lee Executive Park, Fort Lee, N.J. 07024.

MARCH 25-28, PHILADELPHIA — Association for the Development of Computer-Based Instructional Systems' 26th International Conference. Contact: Association for the Development of Computer-Based Instructional Systems International Headquarters, Computer Center, Western Washington University, Bellingham, Wash. 98225.

MARCH 25-28, LOS ANGELES — CICS/VS Logic & Debugging. Contact: On-Line Software International, Inc., Two Executive Drive, Fort Lee Executive Park, Fort Lee, N.J. 07024. Also being held April 1-4 in Fort Lee, N.J., and April 5-11 in San Francisco.

MARCH 25-28, FORT LEE, N.J. — CICS/VS Application Design. Contact: On-Line Software International, Inc., Two Executive Drive, Fort Lee Executive Park, Fort Lee, N.J. 07024.

MARCH 25-29, CAMBRIDGE, MASS. — Knowledge Acquisition for Expert Systems: An Application Perspective on Planning and Developing the Prototype. Contact: James Naughton, Expert Knowledge Systems, Inc., 6313 Old Chesterbrook Road, McLean, Va. 22101.

MARCH 25-29, LAKE BUENA VISTA, FLA. — Tutorial Week East. Contact: Tutorial Week East, P.O. Box 639, Silver Spring, Md. 20901.

MARCH 25-29, ATLANTA — CICS/VS Application Programming — Command-Level. Contact: On-Line Software International, Inc., Two Executive Drive, Fort Lee Executive Park, Fort Lee, N.J. 07024.

MARCH 25-29, BELLEVUE, WASH. — C Programming Workshop. Contact: Kathy Howard, Specialized Systems Consultants, P.O. Box 7, Northgate Station, Seattle, Wash. 98125.

MARCH 25-29, PENNSYLVANIA — The American Society of Mechanical Engineers Short Course Program. Contact: Melinda Harr, Faculty Building, Pennsylvania State University, University Park, Pa. 16802.

MARCH 25-29, HOUSTON — Data Base Development Workshop. Contact: Elise Rabalais, Learmonth & Burchett Management Systems, Inc., Suite 406, 2800 N. Loop W., Houston, Texas 77092.

MARCH 26, NEW YORK — Vams: Its Structure & How to Use It. Contact: On-Line Software International, Inc., Fort Lee Executive Park, Two Executive Drive, Fort Lee, N.J. 07024.

MARCH 26-28, DETROIT — Visions '86 Applied Machine Vision

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NEWS

Conference and Exposition. Contact: Society of Manufacturing Engineers, P.O. Box 800, One SME Drive, Dearborn, Mich. 48121.

MARCH 26-28, CARY, N.C. — SAS Processing Course. Contact: SAS Institute, Inc., P.O. Box 8000, Cary, N.C. 27511.

MARCH 26-29, LOS ANGELES — Unix: A Hands-On Workshop. Contact: Ruth Dordick, Integrated Computer Systems, P.O. Box #5405, 8305 Arroyo Place, Los Angeles, Calif. 90048.

MARCH 27, BELLEVUE, WASH. — Unix for Managers. Contact: Kathy Howard, Specialized Systems Consultants, P.O. Box 7, Northgate Station, Seattle, Wash. 98125.

MARCH 27-28, CHICAGO — Recovery/Restart. Contact: On-Line Software International, Inc., Two Executive Drive, Fort Lee Executive Park, Fort Lee, N.J. 07084. Also being held March 27-28 in Los Angeles and April 3-4 in Fort Lee, N.J.

MARCH 27-29, ARLINGTON, VA. — SAS Basics Course. Contact: SAS Institute, Inc., P.O. Box 8000, Cary, N.C. 27511.

MARCH 27-29, ST. LOUIS — Association for Computing Machinery Special Interest Group on University Computing Centers Computer Center Management Symposium. Contact: William F. Heinbecker, Computer Center, 8001 Natural Bridge, St. Louis, Mo. 63121.

MARCH 27-29, FLORENCE — Association for Computing Machinery European Regional Conference. Contact: Giorgio Valle, Via Eugenio Curial, 40145 Bologna, Italy.

MARCH 27-29, ARLINGTON, VA. — The Network Users' Association (NUA) Spring Meeting. Contact: NUA, Suite 400, 2111 Eisenhower Ave., Alexandria, Va. 22134.

MARCH 27-29, LOS ANGELES — Decision Support Systems for Practical Applications. Contact: Software Institute of America, 5 Windsor St., Andover, Mass. 01810.

MARCH 27-29, CHICAGO — Introduction to Data Communications. Contact: Systems Technology Forum, 9000 Fern Park Drive, Burke, Va. 22015.

MARCH 28-29, CARY, N.C. — SAS Report Writing Course. Contact: SAS Institute, Inc., P.O. Box 8000, Cary, N.C. 27511.

MARCH 28-29, MIAMI — Data Communications and Networking for the IBM Personal Computer and Other Personal Computers. Contact: Digital Consulting Associates, Inc., 6 Windsor St., Andover, Mass. 01810.

MARCH 30-31, CHICAGO — CICS Command-Level Intensive. Contact: Syzed, Inc., 35 W. 36th St., New York, N.Y. 10001.

MARCH 28-29, HOUSTON — Risk Analysis Techniques. Contact: Marjorie Glazer, Computer Security Institute, 43 Boston Post Road, Northboro, Mass. 01552.

MARCH 30-31, NEW YORK — CICS Internal Architecture. Contact: Syzed, Inc., 35 W. 36th St., New York, N.Y. 10001.

MARCH 30-APRIL 2, SAN FRANCISCO — The 10th West Coast Computer Faire. Contact: David Small, Computer Faire, Inc., 181 Wells Ave., Newton, Mass. 02150.

WEEK OF MARCH 31

MARCH 31-APRIL 3, ATLANTA — The International Conference and Trade Fair for Software Mar-

chandisers, Publishers and Corporate and Institutional Users (Softcon). Contact: Softcon, c/o Northeast Expositions, 825 Boylston St., Chestnut Hill, Mass. 02157.

MARCH 31-APRIL 4, ATLANTIC CITY — 1985 Microprocessor Forum. Contact: N. R. Kornfield, Widener University School of Engineering, Chester, Pa. 19013.

APRIL 1-2, BOSTON — Using Dbase III. Contact: The American Institute for Professional Education, Carnegie Building, 100 Kings Road, Madison, N.J. 07940.

APRIL 1-2, STAMFORD, CONN. — Structuring & Negotiating Hardware Contracts, Software Contracts and DP Services Contracts. Contact: The American Institute for Professional Education, Carnegie Building, 100 Kings Road, Madison, N.J. 07940. Also being held April 8-9

in Detroit.

APRIL 1-3, CHICAGO — Purchasing Management and the Computer. Contact: American Management Association, 135 W. 50th St., New York, N.Y. 10020.

APRIL 1-3, BOSTON — Unix. Contact: Center for Advanced Professional Education, Suite 110, 1820 E. Garry St., Santa Ana, Calif. 92706. Also being held April 10-12 in Seattle.

APRIL 1-3, NEW YORK — Data Analysis & Logical Design Workshop. Contact: Elise Rabalais, Learmonth & Burdett Management Systems, Inc., Suite 405, 2800 N. Loop W., Houston, Texas 77002.

APRIL 1-3, WASHINGTON, D.C. — Strategic Data Planning '85. Contact: Barnett Data Systems, 19 Orchard Way N., Rockville, Md. 20854.

APRIL 1-3, WASHINGTON, D.C.

— National Conference on Using Ada: Getting Results. Contact: Conference/Event Manager, U.S. Professional Development Institute, 1620 Elton Road, Silver Spring, Md. 20903.

APRIL 1-4, LOS ANGELES — IBM/DB (DL/I), Application Programming. Contact: On-Line Software International, Inc., Two Executive Drive, Fort Lee Executive Park, Fort Lee, N.J. 07024.

APRIL 2, ROCHESTER, N.Y. — The 20th Annual Upper New York State Systems Seminar. Contact: Thomas Basquino, Association for Systems Management, 24657 Bagley Road, Cleveland, Ohio 44138.

APRIL 2-4, LOS ANGELES — Corporate Personal Computer Expo. Contact: National Institute for Management Research Seminars, P.O. Box 3727, Santa Monica, Calif. 90403.

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VIEWPOINT

Apple takes eye-opening crack at IBM reign


**IBMian
CONNECTION**

Jack Stone

No doubt I was one of untold millions who, after seeing Apple Computer, Inc.'s startling full-page ad on Super Bowl Sunday in the local newspaper, adjusted the normal physiological course of events so that the televised fourth quarter in its entirety would not be missed. If you were busy at the data center that day and didn't see the paper, the ad commanded the reader to avoid bathroom duty during that period and stay glued to the TV set, hinting at a monumental product unveiling — a 1985 year-earlier Macintosh.

Even though no information on the Macintosh Office — aside from the name — was provided in the TV commercial, the promotion was nevertheless dramatic. If you didn't see it, let me present the scenario. A long line of blindfolded businessmen and businesswomen were shown blithely walking to the edge of a mountain precipice where they, one after another, hurled themselves into an abyss, until finally one wise gent lifted his blindfold a moment before his impending self-destruction,

Stone is an independent management consultant, educator and writer, specializing in *DP* human communications and personnel development, based in Washington, D.C.

tion, saw the new machine in the distant horizon and was saved.

Important point made

Ignoring the excessive allegorical implications, there was one important point to be made; one that is hardly unknown to this industry. With respect to business computer systems in general and personal computers in particular, many users, data processors and independent vendors have embraced the IBM design philosophy, even though in many (but not all) situations, IBM systems, compared with the competitors', cost more, are more complex and seriously need enhancement.

Of course, Apple's notion that this direction leads to disaster is typical of the questionable taste the company sometimes shows in its advertising. On the other hand, for the personal computer front at least, I support Apple's TV spot on this point. An awful lot of personal computer users believe, in a Lennon-like way, that they cannot get their jobs done without an IBM-compatible machine upgraded to at least 512K bytes random-access memory and preferably outfitted with a hard disk and incredibly complicated software, irrespective of involved costs and, even more important, the difficulties of use.

Apple's approach with the Macintosh is the antithesis of the current emphasis by IBM software vendors on application systems requiring large machines, more complex operating systems and command repertoires so cumbersome they are impossible to memorize. Lotus Development Corp.'s

Symphony, Ashton-Tate's Framework and IBM's Topview (when, as and if it appears) — examples in point — are simply not meeting the broad range of requirements of the vast majority of business users.

Lennon-style thinking prevails

The ease-of-use factor has been heavily emphasized by Apple in the promotion of the Macintosh, and deservedly so. Yet in spite of the Macintosh's obvious advantages, Lennon-style thinking prevails in the selection process in business circles, as demonstrated by the continuing domination of IBM and similar machines. Of course, other well-known problems with the system have played roles in limiting its acceptance within the business environment to date. (The office version of the machine — whose details were unavailable when this article was written — may resolve these problems and improve the acceptability.)

However meager, some free thought may be on the way. One of many reasons why the best-selling "addictive" utilities program has become popular, aside from the fact that it supplies answers to important but mundane information-handling needs, is that IBM Personal Computer users have discovered at least one very useful and efficient business program that can run on their machines and does not require them to spend hours studying how to install the product, days to determine its compatibility with existing programs and weeks to memorize the contents of a 100-, 200- or 500-page operations manual.

Cluster training avoids 'duckling' syndrome


**MANAGEMENT
MATRIX**
Walter F. Curie

You've been running a nice, tidy data processing operation in the corporation for a number of years. It's a taut ship, with projects generally finished on time and on budget. Clear weather and smooth sailing.

One day a friend calls. It seems they've bought a personal computer or two over in marketing and are wondering if you would mind sending someone over just to run a quick, informal, introductory seminar for the prospective users. This doesn't seem to be too much of a problem; there's a little slack in the time budget, so you do it.

A month later, you get another call from the same person. They've got a few new employees and ask if you would mind having that designated instructor repeat the seminar (people really got a lot out of it last time). The two of you agree on a charge back for the time involved, but your instructor is reluctant to repeat the seminar because of the calls for help that have been coming in since the last seminar. Besides, things are tighter this month and you've got to open up some time first; while you're looking for that, another department

calls: "We heard about that seminar your people did for marketing. Do you think..."

DP gets the job

Like it or not, DP often winds up with this job. If you were lucky, you were formally charged with providing this kind of support before any personal computers were introduced. If you were not, you wound up with the formal charge at about the fourth or fifth seminar request. Your department is now in the education business.

Education is time and labor intensive.

can least afford.

The real pitfall here isn't in finding staff time to formulate and present seminars; it is in the tacit assumption on the part of the participants that you will provide ongoing personal support. Often, particularly in small-group corporate settings, trainees will act like ducklings and call the instructor for all kinds of things after the course is over. It's flattering, but its wearing. You are not staffed for it, you probably don't want to staff for it, and even if you did, it just gets bigger and it's impossible to bill. Solve the duck-

loaded and nothing gets serviced effectively.

Mentors act as cluster controller

Now consider clusters. When they are made up of people, the educational equivalent to the cluster controller is called a mentor. Mentors train and support the members of the group from their own departments, for which they are responsible. They answer the telephone calls coming from members of their groups. Your department supports the mentors, but once you take a look at how the time works out, they are not ducklings anymore. They are swans.

The client department shoulders a fair amount of responsibility: The client has to nominate the mentor; the client has to free up that person's time for support; the group members, when they get the urge to act like ducklings, will go to their mentor rather than to your people. So far, these advantages for you look like decided problems for the client, but one thing outweighs all that. Because the nominee is selected from within the client department, the mentor already knows how that department operates and what the needs are. That's a powerful advantage for the client, and one your people could not supply as readily or as effectively.

Individual attention is essential if this is going to work at all. Fifteen is about the largest you should allow any group to get in either your sessions with mentors or theirs with their groups. Even that is pushing it; 10 is better. Don't give in to the temptation to expand the attendance —

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The real pitfall here isn't in finding staff time to formulate and present seminars; it is in the tacit assumption on the part of the participants that you will provide on-going personal support.

sive. The boss may like the charge-back arrangement on the seminars, but it upsets scheduling to have no real control over the demands that other departments put on you for support. The work requires your best "people" people, too. Sure, you could try to send over your star analyst, but as good as he is on the job, that person orders lunch unthinkingly. The best candidates for instructors are often staff members in some kind of supervisory position precisely because of their interpersonal skills. They are the ones whose time you

ling problem, and the rest will fall into place.

The solution, at least in concept, may well be just outside in the computer room. Consider the difference between a star network with individual terminals and one with clusters. In a situation where every terminal must have a direct connection to the host, you know you are heading for trouble if you add lines willy-nilly. That's the situation your department is headed for if training and support are done by your human "communications handlers" — they get over-

Curie is a senior associate with Nicholas DeMatto Associates in Bryn Mawr, Pa.

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VIEWPOINT

Overhaul needed to bolster OAC attendance, interest



VIEWPOINT
Glen Nish

The burning question in Atlanta late last month was, What's happening with office automation? Judging from the turnout at the American Federation of Information Processing Societies (AFIPS)-sponsored Office Automation Conference (OAC '86), the answer was clear: Not much.

The show was a dreary affair for the second straight year with a noticeably small turnout from both attendees and vendors. At OAC '83 in Philadelphia, nearly 30,000 visitors poured into the convention center to see the wares of 150 vendors. AFIPS has stopped giving out attendance figures, but this year's turnout was probably half that of the Philadelphia conference and the vendor count was down to around 100. Cold and rainy Atlanta was certainly a turnoff, but last year in sunny, warm Los Angeles, the response was similarly poor.

Although heavyweights such as IBM, Digital Equipment Corp., Data General Corp., Wang Laboratories, Inc. and Hewlett-Packard Co. were all on hand, their presence was perfunctory at best. Not a single major announcement rocked the show, and the consultants and media spent their time at vendor parties wondering what happened to noticeably absent Apple Computer, Inc.

OAC out of gas?

So what is happening to office automation? The consensus of the diehards who marched dutifully to Atlanta is that the term "OA" has simply run out of gas. It is difficult to find another explanation because the issues surrounding OA continue to be among the hottest in the industry. Yet to a good many MIS people, OA still conjures up images of word processing and electronic typewriters.

Clearly, OA has gone far beyond that. Integrated office systems with voice and mail capabilities, compatibility among vendors, personal computers, intelligent workstations, high-speed voice and data networks, communications, integrated software and a host of top priority issues fit easily under the OA umbrella. Unfortunately, it seems that a lot of key people in the data processing industry are unaware of that, and perhaps the time has come to finally put the weary term to rest.

The vendors have already begun to do just that. Only Wang continues to bill itself as the OA company. The others are selling integrated office systems, business automation and office information systems. Corporate America is apparently looking for a jenny, sexy new way to describe the office of the future, and OA just won't

cut it anymore. If OAC '86 is to avoid the continued decline of its recent predecessors (and its scheduled Houston location certainly isn't going to help), AFIPS should consider changing the name.

How about Integrated Office Expo '86? Or Office Info Systems Conference? Or Just a Big Show to Get You Out of the Office?

A new name, however, may not be enough. Trade shows in general are suffering in the computer industry. Attendance at many major shows, such as the National Computer Conference and Synopsicon, has dropped in recent years and may be on the decline, and the large and influential vendors are beginning to question the value

of being at these shows at all. Said one vice-president of a major manufacturer, "The days of the exciting new hardware product announcements are over, and we're at this point now where the customer wants to know how to put all this stuff together." At a cost of an estimated \$250,000 for some of the

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**Goal
Systems**

"MORE MANUFACTURERS CHOOSE US BECAUSE OF WHAT WE CHOSE: VAX."



Mark W. Ciolek
CEO and President
NCA Corporation

American manufacturers are facing a fiercely competitive and highly aggressive environment that's global in scope.

The key to survival in the face of all this is control. Control over shrinking profitability, increasing costs and reduced planning times. Which means automation through computerization.

But computerizing the manufacturing process is no guarantee of survival. Choosing the

wrong approach could be just as costly as not automating at all.

As one person intimately involved with manufacturing, Mark W. Ciolek, explains: "Manufacturing today has to be treated as an integrated process instead of as isolated functions. Successful manufacturers are discovering that with the right approach to computer-integrated manufacturing (CIM), you can produce goods quickly without sacrificing quality."

Mark is CEO and president of NCA Corporation, a leading software developer and marketing company that's helping manufacturers stay competitive with a manufacturing resource planning (MRP II) system called MAXCIM™.

With 20 integrated modules, MAXCIM is designed to handle everything from financial planning in the executive office to job

tracking on the factory floor.

"Our comprehensive approach requires a flexible computer system with a wide range of solutions," Mark points out. "That's why we chose Digital's VAX™ computers for MAXCIM. And that's why manufacturers are choosing us."

"VAX GIVES YOU THE WORLD'S MOST FLEXIBLE ARCHITECTURE"

Digital designed the VAX computing environment in a unique way – around one architecture and Digital's VMS™ operating system. "They're the only ones who have done this," Mark states. "As a result, we know we're working with the most flexible system available."

Included within the VAX computing environment is the VAX Information Architecture, a comprehensive system of integrated


information management software products. From this vast array of products, NCA's customers can select those best suited for their needs.

Three of these VAX Information Management products – FMS™ forms management system, DATARIEVE™ query language and report writer, and Common Data Dictionary – are used in conjunction with MAXCIM. By incorporating these products, MAXCIM optimizes the user-interface, and provides easy access and universal definitions for all of your data.

Customers also have the option of adding other Digital software such as DECnet™ networking software. The tremendous communications capabilities between Digital systems allows for unequalled distributed processing power. So you can access and exchange information –

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whether it's stored across the plant or at a plant across the country.

"Digital's approach to software is ideal for MAXCIM because the performance of an MRP II package is enhanced by the degree of integration between modules," Mark says. "And the superior integration within both MAXCIM and the VAX Information Architecture gives manufacturers the most flexible solution possible."

"AS PRODUCTION INCREASES, SO CAN THE POWER OF VAX."

"The economies of manufacturing demand standardization and growth," Mark points out. "With VAX computers, our customers have both."

Every model in the best-selling 32-bit architecture, from the MicroVAX I™ system right up to the largest VAXcluster™ system, is compatible, providing an economical growth path from desktop to data center.

"Because of this compatibility, you can use MAXCIM across the entire line of VAX systems," Mark says. "So when our cus-

tomers upgrade, they can bring their existing applications right along with them."

This eliminates the need to convert databases, retrain people or totally abandon your investment. And VAXcluster systems provide enough computing resources to meet virtually any requirement.

"VAX computers let us meet the needs of just about any manufacturer," Mark says. "The low-end of the VAX family is ideal for smaller manufacturers, while clustering makes our solutions attractive to

much larger companies. Some of our business now comes from existing customers who are upgrading their Digital systems to meet their growing needs."

"DIGITAL IS THE LEADER IN THE MANUFACTURING MARKETPLACE."

"Digital has a solid reputation among manufacturers,"

Mark states. "After all, they're the leader in distributed processing and are committed to CIM with dedicated resources. And the VMS operating system provides an unparalleled path for growth."

In fact, Digital anticipates and meets manufacturers' needs so successfully that NCA developed MAXCIM to run exclusively on Digital systems.

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tem," Mark says. "They're the experts in systems and we're the experts in MRP II software. Together, we can offer manufacturers the most comprehensive solution."

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digital™

VIEWPOINT

OAC

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large companies to set up shop for three or four days (not to mention the man-hours of having key personnel on hand), the return may simply not match the costs.

The conference sponsors claim that although attendance is down, the people who do show up are the "quality" types, the serious buyers. At OAC '85, it was difficult to assume who the buyers were. At many

booths, company employees were simply standing around talking to each other. At the busier stands such as IBM,

DEC, DG and Wang, the number of booth attendees certainly equaled visitors, and if volume sales were being

made, it was hard to pick out who was doing the buying.

The usual OAC big names such as Amy Wohl and Michael Hammer drew paid sessions, but the rest of the schedule was redundant and inert.

One particular session promised a debate between Karen Nussbaum of the labor interest group 9-to-5 and a trade association representative on the potential health hazards of the VDT. Nussbaum failed to show up but

the panel plunged onward and gave 90 minutes to one side of the issue.

Whatever the root of OAC's problem, it is clear that change is in order if it is to survive. Perhaps the end users of America have discovered what Hammer has been saying. There is no such thing as OAC; there are only specific business problems that need solving. And perhaps they have discovered that trade shows are simply not the format for finding the answers.

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Said one vice-president of a major manufacturer, 'We're at the point now where the customer wants to know how to put all this stuff together.'

Name-dropping just isn't enough to impress the network critics.

Now that the local area network (LAN) industry is booming, some pretty big names in the computer business are jumping on the bandwagon. Their goal is simple: get a LAN on the market and let all those who pay homage to The Name run out and buy it.

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there's no advantage in it.

Returns start to diminish rapidly when sessions run over three full days. Less than half a day is relatively ineffective for a formal session. One to two days is nice. Allow the preparation time for your staff person to equal the scheduled length of the seminar if the session has been run before and at least twice that if it's new.

Try to limit your sessions with the mentors to once a quarter but at least that often. Even if the mentors don't have any new applications or apparent changes, your people can offer them "advanced" training and handle their common problems, and they will pick up new points of view about how your operations fit in with other departments. The sessions are useful for both sides, keep channels open and ultimately cut down on support calls to your people.

Now look at some numbers. Consider one three-day initial session with three one-day advanced sessions on a given package over the course of a year. That's 16 workdays — including new session preparation time — from the year's time budget to train 10 mentors and potentially 110 users altogether. If each mentor makes one 15-minute support call to your staff each week, that's about 16 additional workdays for the year. Overall, you will need to free up about 9% of a work year on your staff to do all of this. That's not insignificant.

Compare that with the direct training of 110 people. The initial session alone would cost you 66 workdays covering 11 sessions in 10-people groups. Does one 15-minute support call every week from each seminar participant for the first month following the session sound reasonable? Given a session a month, that's an astounding 1,100 calls in a year — about 34 workdays answering essentially the same questions. It costs 36% of a work year just for the initial session — roughly three times the cost for half the actual instruction under the mentor system.

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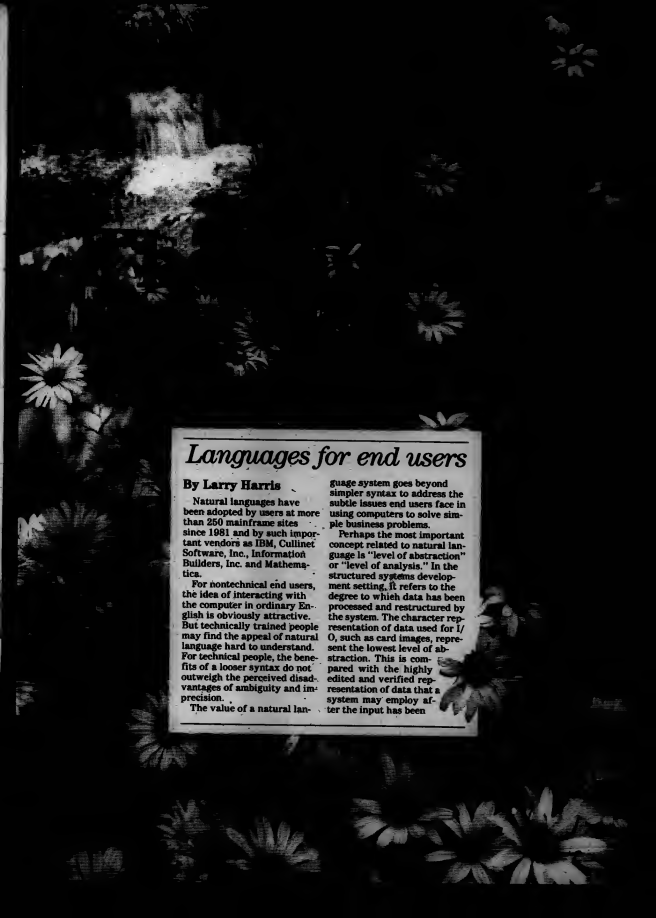
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Languages for end users

By Larry Harris

Natural languages have been adopted by users at more than 250 mainframe sites since 1981 and by such important vendors as IBM, Cullinet Software, Inc., Information Builders, Inc. and Mathematics.

For nontechnical end users, the idea of interacting with the computer in ordinary English is obviously attractive. But technically trained people may find the appeal of natural language hard to understand. For technical people, the benefits of a looser syntax do not outweigh the perceived disadvantages of ambiguity and imprecision.

The value of a natural lan-

guage system goes beyond simpler syntax to address the subtle issues end users face in using computers to solve simple business problems.

Perhaps the most important concept related to natural language is "level of abstraction" or "level of analysis." In the structured systems development setting, it refers to the degree to which data has been processed and restructured by the system. The character representation of data used for I/O, such as card images, represent the lowest level of abstraction. This is compared with the highly edited and verified representation of data that a system may employ after the input has been

IN DEPTH/THE NATURALS

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Many development problems can be traced to an attempt to solve problems at the wrong level of abstraction on the wrong data structure.

processed. This is the same information at a higher level of abstraction.

A natural language system is a perfect example of several levels of abstraction in a single system because it must represent the input request in so many forms. The original input appears as a simple character string, the lowest level of abstraction. Subsequent analysis will represent this same request as a linked list structure of the words in the sentence, the syntactic parse tree representing the syntactic structure of the sentence, and ultimately the semantic list structure that represents the meaning of the request. This is the highest level of abstraction.

Level of abstraction is so important because a given problem is nearly always best solved at a given level. To solve it at that level with the

proper data representations is usually very easy. To attempt to solve it too early or too late at the wrong level of abstractions and in the wrong data representation can be extremely uncomfortable. Many problems in system development can be traced to an attempt to solve problems at the wrong level of abstraction, on the wrong data structure. An understanding of this issue is an absolute requirement for effective problem solving of any kind and particularly when using computers. An

excellent reference on this subject that illustrates its importance even on complex biological systems is "The Architecture of Complexity" by (Nobel Laureate) Herb Simon.

The importance of this concept with regard to end-user interaction with computers has nothing to do with the internal design of natural language systems. The issue arises because the end user is solving problems. The user wants information that will help solve a real business problem. In essence, the hidden val-

ue of a natural language system is that it is a tool at the correct level of abstraction for business problem solving. The language system turns out to be of little importance when compared with the necessity of providing a tool at the proper level of analysis for the user.

All formal computer systems provide a small set of primitive operations for the user. It is up to the user to specify the proper sequence of these primitive operations to solve the overall business problem. Indeed, this is the essence of programming. The primary difference is the level of power associated with the primitives. Assembly language provides very weak primitives. Procedural languages such as Fortran or Cobol were a major improvement but still offered relatively weak primitives. Structured programming languages such as PL/I or Algol provided more modular, but still very weak primitives. It was not until the advent of the fourth-generation languages that the primitives became much more powerful.

It should be clear that the concept of level of abstraction really underlies all of this. The entire evolution of programming languages, in a sense, is nothing more than the primitive operations taking place at higher and higher levels of abstraction. That is, they are further and further removed from the physical representation of data on the machines.

I will even include the spreadsheet languages such as Lotus Development Corp.'s 1-2-3 in this discussion. The users of 1-2-3 do not think of themselves as programmers. But in this view, anyone who specifies solutions to problems as a sequence of primitive operations on a computer is indeed programming. The difference is the level of abstraction of the primitives. The 1-2-3 package appeals so much to users because it provides a set of primitive operations at an appropriate level of abstraction for solving a broad set of important business problems. Indeed, it is an ideal illustration of the power of providing tools at the appropriate level of abstraction and why this concept is so important for assessing end-user problem solving on computers.

Business problem solving

The effectiveness of a business problem-solving tool is related to the degree to which the user can stay at a constant level of abstraction. If the user is forced to bounce back and forth across a variety of different levels of abstraction, he will not be able to solve effectively the business problem at hand. If, on the other hand, the user is able to remain on a constant plane of thought, the solution will be a relatively straightforward sequence of primitive operations.

A good example of the problems caused by mixing levels of abstraction arises in the use of fourth-generation languages. If the problem is such that it can be expressed fully in terms of the nonprocedural primitives, it will be extremely easy to solve. But, if the problem is such that an exceptional situation forces you outside the nonprocedural primitives, then the solution to the problem will be much more complex — if it is even possible.

It is important to realize that we give something up as we use higher and higher level languages. The

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scope of problems they can solve becomes more restricted. The one positive thing that can be said about assembly language is that it can be used to solve any type of problem.

As we go up from there, we give up the ability to solve all problems to solve a more narrow range of problems more effectively. In general, a problem should be solved with the highest level language that can solve it.

There is an even more critical reason why mixing levels of abstraction must be avoided. Very often, switching to a lower level of analysis requires a different kind of knowledge. For example, switching to assembly language for one procedure in a PL/I or Cobol system clearly requires a different set of skills. It is this simple fact that ultimately paralyzes end users in their attempts to use even the high-level fourth-generation tools to solve their problems. They are occasionally required to know things that they simply do not know. It is an obvious manifestation of being forced to use a tool at the wrong level of abstraction.

A perfect example of this is the join clause in a relational data base query. If the user's request requires data from two or more tables (files), then the user is required to include a clause such as "Table1.key = Table2.key." The user may not even know that the data resides in two separate tables, much less what keys must participate in the join. Forcing end users to interact at this level of abstraction forces them to specify things that they simply do not know or understand. For this reason, it is even more critical to provide a tool for end users that allows them to work on a constant level of abstraction that is appropriate for them.

What is right level?

What is the right-level tool for end users? Why aren't the fourth-generation languages and relational query tools appropriate? These are important questions in understanding the value added by the natural language approach. The answer comes once again from considering the different levels of abstraction involved in the representation of data.

Since the early days of data base theory, it has been recognized that there are at least three important views of the data: the physical level, the logical level and the conceptual level. The physical level represents how the data actually lives on the storage medium. It is the lowest level of abstraction. The logical level represents how the data looks to the application programs that build and manipulate the data. Simply stated, it is the

role of a data base management system (DBMS) to map requests for information from the logical level to the physical level.

This role may sound unimportant, but we are all aware of the important benefits that this data independence provides to the application programs. Actually, an entire generation of enterprise problems was caused by application programs working too close to the physical level, that is, at the

wrong level of abstraction. Nearly everyone who has been in the data processing business for more than a few years has experienced the painful impact of this mistake.

The conceptual view represents the way users think about the data. This view has nothing to do with computers, because users thought about their data long before computers were invented. Expecting users to interact with the computer

at the logical level is even worse than forcing application programs to work at the physical level. At least the application programmers knew enough to make programs work at the physical level — they were just impossible to maintain. Again, forcing the end users to work at the logical level requires a knowledge level that they just don't have.

What is needed is a facility that is the analog of a DBMS, with the exception

that it maps from the conceptual view to the logical view. This facility would allow end users the ability to interact consistently at the conceptual level of abstraction. It is important to note that if we do not provide such a conceptual-to-logical mapping facility, the user is forced to carry out this mapping himself.

All business problems originate at the conceptual level. There were business problems even before there

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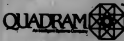
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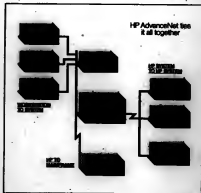
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were computers. These problems are clearly independent of any particular logical data base design that we might choose. Of course, asking the user to carry out this mapping is equivalent to asking the user to interact in, and thereby fully understand, the logical view.

Conceptual view

The proper facility for automating this mapping from the conceptual to the logical view is a natural language system. It is crucial to realize that since the conceptual view is the way the user thinks about the data, this view is inherently ambiguous, inherently informally structured and inherently thought of in the user's natural language — namely, English for those of us in the U.S. A commitment to dealing with the user's conceptual view is a commitment to dealing with the English language (and a lot more), because this is the language in which the user thinks.

To introduce any other formalism is to require the user to map from the logical conception of the problem to its formal representation. To do so is to avoid solving the exact problem we are trying to solve. Simply stated, the real value of a natural language system is that it allows users to interact at the only level of abstraction with which they are comfortable: the conceptual view. As we can see, this has very little to do with syntactic issues but addresses issues that almost everyone with a technical background has felt directly — solving a problem at the wrong level of abstraction. An example of how this

SHOW ME THE SALES PERFORMANCE OF EACH PRODUCT LINE.

PRODUCT	1985 ACTUAL YTD SALES	1985 PLAN YTD SALES	% OF PLAN
COPPER	\$127,328,985	\$108,988,000	68.1
COMPUTER	\$261,708,990	\$236,743,800	116.4

Figure 1

HOW DID COPPERS PERFORM LAST QUARTER IN EACH MARKET?

MARKET	1985 ACT Q2 SALES	1985 PLAN Q2 SALES	% OF PLAN
ALABAMA	\$1,973,898	\$4,672,800	42.4
ALASKA	\$2,382,824	\$4,968,300	102.8
ARIZONA	\$1,544,833	\$3,902,000	68.6
ARKANSAS	\$1,788,871	\$6,788,200	100.1
CALIFORNIA	\$1,844,018	\$3,818,400	68.4
COLORADO	\$3,126,773	\$4,672,800	66.9
CONNECTICUT	\$3,982,110	\$3,984,000	78.8
DELAWARE	\$3,414,387	\$3,708,400	92.1
DISTRICT OF COLUMBIA	\$4,194,812	\$6,064,400	69.2
FLORIDA	\$8,013,487	\$6,287,200	127.1
GEORGIA	\$2,718,907	\$3,036,000	89.6
HAWAII	\$1,448,977	\$3,712,800	38.0
ILLINOIS	\$7,180,886	\$6,788,200	105.7
INDIANA	\$2,388,281	\$4,408,400	54.4
IOWA	\$3,884,816	\$6,884,400	56.4
KANSAS	\$1,488,438	\$1,872,000	80.1
KENTUCKY	\$4,843,842	\$5,048,000	95.9
LOUISIANA	\$1,848,783	\$2,838,800	64.9
MAINE	\$7,788,338	\$7,788,400	100.8

Figure 2

applies in the case of end users will derive the point home.

Consider a product brand manager trying to understand why overall sales were off for his product line so that he can determine the proper corrective action. Assume that he has at his disposal a data base con-

taining the actual and estimated sales for all products for the past year, for all markets and all channels of distribution.

By probing the data, the brand manager may determine that only certain markets are off and that additional advertising may be the pro-

or response. It may be that only a single wholesaler is below plan and that pushing that wholesaler or establishing a new channel is the proper reaction. A sequence of questions such as the following would get at the heart of the issue:

SHOW ME THE SALES PERFORMANCE OF EACH PRODUCT LINE.

In Figure 1, note that year-to-date copper sales are below plan. The next step would be to look at copiers in more detail.

HOW DID COPPERS PERFORM LAST QUARTER IN EACH MARKET?

Figure 2 shows that copier sales are down in the last quarter in nearly all markets. Perhaps the next step should be a graphical display of each of the copier products.

GIVE ME A BAR GRAPH SHOWING THE ACTUAL AND PLANNED COPPER SALES OF EACH PRODUCT.

The graph might show that sales of medium-size copiers are off the most. The user could go further.

ADJUST, BUT FOR MEDIUM-SIZE COPPERS IN EACH DISTRIBUTION CHANNEL.

The resulting graph might show that sales for the medium-size copiers are dramatically off through distributors.

This sequence seems very natural and very simple. It was carried out on a consistent level of analysis. It was independent of the underlying data structure and allowed the user to concentrate on the business aspects of the problem without having to interrupt his train of thought and worry about technical details with

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which he is not trained to deal.

In order to appreciate the value being added by the natural language system, let us consider the nature of the mapping from the user's conceptual view to a typical logical view for this type of data base. In doing so, we will see the issues the user would have to deal with in order to carry out this mapping himself. Forcing the user to deal with these issues is inappropriate.

In addition to structural issues, we have performance considerations. Often, these data bases are so large that subtotals must be stored within the data base to avoid having to calculate them on the fly.

Logical view

In order to provide the information needs of a marketing manager, the marketing data base must contain both actual and estimated sales information over several time periods, which may stretch across several years. In addition, the information must be available for all product lines, each product within a product line and for all distribution channels. Not every problem will require analysis along each of these dimensions, but the data base design must be sufficiently general to handle analysis along each dimension.

The structure of this data is complex. It could be represented in many different ways. It could be in multiple files, one for actual data and one for estimates. It could be stored in several multiple dimensional arrays. It could be stored in relational normal form. It could be stored with the time periods as fields or with time periods as data values. Data base designers will argue over the one best structure. The user, of course, couldn't care less, because the conceptual view is independent of whatever logical design we might choose. However, the user will have to care if we ask him to understand the particular design we select.

There are various issues that the user must deal with in order to express the first question in the logical form of a fourth-generation language. The issues are of two types: the mapping from the conceptual view and the manipulation of the data to bring it to the proper level of analysis.

Conceptual mapping

These issues relate to where and how the data is stored in the data base. The user must confront the obvious issues of what files to access, fields to retrieve and records to select. Each of these has surprising subtlety.

Even the most basic issue regarding which files need to

be accessed raises questions. Is all the data in one file? In multiple files? If it is in multiple files, how must the files be joined together?

Expressing which fields to retrieve can be extremely complex. Because the data represents a time series, it may be stored in a periodic group within the data base. In this case, the user must enter a subscripted name such as SALES(18) or

SALES(131). The burden of mapping "actual & estimated

sales for last month" to this cryptic form would fall upon the user. On the other hand, the field names might be memorably named, such as "84-ACT-AUG-SALES" and "84-EST-AUG-SALES."

Even with this improvement, we are forcing the user to think in extremely rigid terms by insisting that every name be fully qualified in a precise order. Even employing one of the form-filling menu schemes does not work on this type of data base,

because there may be literally hundreds of time periods, making it extremely time-consuming to scroll across many screens to select them for retrieval. It is hard to imagine a simpler or more natural way than just typing "last month's actual and estimated sales" or "Jan act and est sales" to minimize typing.

Expressing the criteria for record selection is surprisingly subtle. It is obvious that the user wants data for

the coter sales, but is "copier" a product line or a product? Is it coded in the data base? If so, how? Does it appear as one code or a different code for each type of copier? Worse yet, if subtotal records are stored in the data base along with detail records, the user must be sure to select them in or out, depending upon the dimension along which the summation is to be performed.

For example, our second question requires subtotalling

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IN DEPTH

The PBX: equal rights for voice and data

By Holger Opperbeck

With the introduction of PBXs that support virtual connections, we have now reached a point where PBXs support voice and data switching equally well. At last, PBXs are not dominated by voice switching anymore.

It is an irony that private voice switches have pretty much been limited to switching voice connections even though none of their names include the word "voice." They are called private branch exchange (PBX), private automated branch exchange (PABX), computerized branch exchange (CBX) and so on. Yet the information typically exchanged is just voice.

In the early 1980s, PBX manufacturers elected to offer PBXs that handle data traffic in addition to voice traffic (for example, Rolm Corp.'s CBX and Northern Telecom, Inc.'s SL-1). These PBXs took the basic approach of making the data look like voice.

The devices that were used for this conversion had names like Data Terminal Interface (Rolm) or Add-on Data Module (Northern Telecom). Data is accepted by these devices via an RS-232C interface, encoded into a digital bit stream (usually 64K bit/sec) and switched like a voice connection. Thus, these PBXs provided only a very low level of voice/data integration. They were dominated by the voice switching requirements. Data was introduced into these systems as an afterthought.

Since 1984, PBXs have been available with architectural capabilities that deal with voice and data on an equal basis. Examples include Intecom, Inc.'s IBX; GTE Business Communication Systems Omni; Zitel, Inc.'s PNX; and CXC Corp.'s Rose.

These PBXs use switching techniques that are well-suited for both voice and data. They are not limited by the fixed bandwidth allocation schemes used for voice switching in the past, but allow

more flexible, dynamic bandwidth allocation even on the local access line. At last, we are seeing the emergence of PBXs that are not dominated by voice switching anymore.

The PBX has long held immense potential as the most economical and workable solution for the rapidly growing voice and data communications needs of business. This potential has not gone unrecognized, but until now it has gone largely unrealized. For years, manufacturers and users of PBXs have seen that their central voice switch would also be the ideal candidate for accommodating their data switching requirements.

Numerous advantages

The points in favor of the PBX as a data switch are numerous. First, the PBX provides an existing network of installed lines that runs from every office to the central switch, creating a de facto local-area network. Second, the PBX can be connected directly to long-haul transmission networks via T1 interfaces using media such as conventional cable pairs, coaxial cables, fiber optic, satellite and terrestrial microwave links. These interfaces provide high-speed access to public and private communications networks.

Third, PBXs have always provided the most sophisticated administration and maintenance capabilities required to manage complex telecommunications systems.

The problem, therefore, was one of technology, of fulfilling the potential of the PBX in the area of data communications. Over the last five to eight years, the attempts to produce a completely integrated voice/data PBX have brought it through three basic phases of development. With each phase, the data capabilities of the PBX improved, and the true integration of

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The entry of PBXs with digital local access into the market in the early '80s marked the beginning of the second phase of integrated voice/data communications.

voice and data moved a step closer to reality.

The first phase of data handling was characterized by the use of modems. During this phase, the PBX was essentially unaware of the fact that it was handling data.

The second phase introduced digital technology on the local access wires. Digital technology made it possible for the PBX to handle data more effectively but still left unresolved the fun-

damental problem of accommodating the unique characteristics of data traffic.

The third phase is characterized by the emergence of a truly integrated voice/data PBX, with switching and local access capabilities that serve voice and data equally well.

In order to appreciate fully the advantages of the third phase of voice/data integration, it is necessary to briefly review the approaches and limitations of the first

two phases.

From the late '70s until 1980, PBXs were designed and built to act as voice-only switches. Figure 1 shows a symbolic representation of a switching matrix. The solid black areas represent dedicated bandwidth in the switching matrix and on the local access line. Although data could be sent through these early PBXs, the data stream had to be converted to a format that made it look to the PBX like a voice call.

This conversion to voice format at the input and back to data format at the output was accomplished by modems. Thus, PBXs handled data in the same way data was handled for transmission over the public telephone network. Usually, a telephone was associated with the modem to set up the data call in a way that is very similar to dialing voice calls.

Phase I PBXs were unable to provide error correction or concentration of data into high-speed lines or ports. This inability meant that all data had to be switched on a direct line-to-line, low-speed access basis. These constraints not only limited the value of the PBX for data communications, but also demanded substantial investment to support any data communications capability at all. The cost of modems was compounded by the cost of lost voice capacity. The more extensively the PBX was used for data communications, the higher the cost in terms of lost voice capacity.

Conflicting demands

The major factor hampering these early PBXs was the conflicting demands that voice and data traffic impose on switching systems. Phase I PBXs were designed specifically as voice switching devices.

Voice-only PBXs are built for call durations of only a few minutes, which is characteristic for voice calls in the office environment. They dedicate a fraction of the available switching capacity to each voice call. This is an effective way of handling

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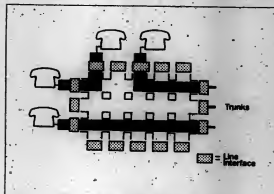


Figure 1. Voice-only PBX

voice communications because phone conversations require a continuous information exchange.

The problem arises when PBXs attempt to switch data in the same manner as they switch voice. Data calls, unlike voice calls, can last for hours. At the same time, data connections require short, high-speed bursts of data transmission that are separated by long periods of silence. Most of the time, therefore, the switching capacity of the PBX, which is dedicated to data connections, is unused.

This waste of switching capacity lasts for the extended duration of data calls. In short, running data

communications on the voice-only PBX of the late '70s is an inefficient and expensive proposition.

Digital access

The entry of PBXs with digital local access into the market in the early '80s marked the beginning of the second phase of integrated voice/data communications. When a digital local loop is used, the expensive modems are replaced by devices variously called data terminal interfaces, data access modules, data adapters and so on. We will use the term digital data interface here.

The digital data interface connects to the data devices (terminals

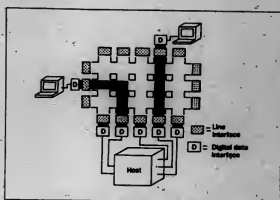


Figure 2. Data via digital data interfaces

or hosts) via RS-232C or V.35 interfaces just like modems. The received data bits are transmitted digitally to the PBX by inserting them into a digital pipe — usually, but not necessarily, a 64K bit/sec bit stream. This digital pipe is switched by the PBX just like it switches voice calls (see Figure 2).

The digital data interface is much more intelligent than a modem. It does not require an associated telephone to set up data calls but can directly communicate with the user via the terminal keyboard and CRT. Control information is exchanged with the switch over the same digital access link. The control information is converted into a special message-oriented format that the PBX knows how to interpret. Thus, for the first time, the switch must be aware of the fact that it is not dealing with a standard analog telephone but a more sophisticated device with different requirements.

The digital data interface can be a stand-alone device or it can be integrated into the new generation of station equipment. Several digital telephones have been developed with an optional digital data interface. Advanced workstations have the interface directly built-in, and personal computers can be provided with expansion cards that implement the digital data interface function.

In some cases, this integration is only a physical integration — that

is, housing, power supply and so on are shared — but not an integration of voice and data on the access line. There are actually two wire pairs running to the PBX, one for voice and one for data. These wire pairs connect to different line interfaces at

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For the first time, the switch must be aware of the fact that it is not dealing with a standard analog telephone but a more sophisticated device with different requirements.

the PBX, which itself is only physically integrated.

Cost-effective solution

A more cost-effective solution results if voice and data devices are not only physically integrated, but if they share the local access wires and the line cards at the PBX. The bandwidth of the local access lines is divided between voice and data. The PBX separates voice bits from data bits and switches both information



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streams independently (see Figure 3). We will call this level of integration "access integration" of voice and data. An access-integrated PBX has essentially twice the capacity of an only physically integrated PBX. It has the same number of ports since each port can serve a voice and a data device.

It appears that access-integrated PBXs are able to switch voice and data equally well. A closer look, however, reveals that these PBXs are still heavily dominated by the voice-switching requirements. Bandwidth on the local access line as well as switching capacity is still fully dedicated to a voice or data connection. Thus, even though economies have been achieved because of the access integration, data is essentially switched like voice in a circuit-switching mode and not in the more efficient packet-switching mode.

X.25 services can only be provided by means of a special interface that converts between the circuit and the packet world. This interface may be packaged as a physically separate device or integrated into the PBX hardware. In both cases, however, it is logically separate from the switching function.

In spite of the progress that was made by the Phase II PBXs toward integrated voice/data handling, these systems are still dominated by the voice-switching requirements. A more balanced approach to voice/data switching requires the introduction of true packet-switching capabilities as they have been available in data communications equipment for a number of years. These capabilities are now emerging in the third phase of voice/data integration.

The new concept, which is introduced by this third phase, is the concept of a virtual connection. A virtual connection is a logical association of two end points.

The two end points can exchange information whenever they desire after a virtual connection has been established. The important consideration is that the switch does not reserve any switching capacity to a virtual connection. Therefore, the long intervals of idle time that are not typical for data communications do not consume any switching capacity. Moreover, the bandwidth of the local access line can be allocated to multiple connections as required instead of being dedicated to serve just one voice and one data call.

Virtual connections have several attractive features. They do not care what application they are being used for. They represent a universal transport mechanism that is independent of format, speed or content. Thus, they can be used for voice, data, text, facsimile and other applications equally well. They consume transmission and switching re-

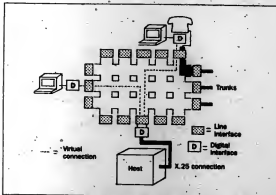


Figure 3. Voice/data access integration

sources only when required. This dynamic allocation of resources reduces the total resource requirements substantially.

The dynamic resource allocation introduces potential delays because of competition for resources among multiple connections. In the data world, these delay considerations

the voice connections can be handled in the switch on a higher priority level by separating the pulse code modulation samples from data bits and switching them via a noncontention bus.

GTE Omni's dual-bus architecture with one bus for the switching of voice in a dedicated mode and one bus for switching of data in a contention mode provides the user with both worlds. It guarantees voice quality because of its priority handling of pulse code modulation samples and brings the flexibility of virtual connections to every station connected to the PBX. Zet's PAX and CXC's Rose system provide similar capabilities using local-area network technology.

Virtual connections

The advantages of virtual connections have not yet been generally recognized. Most PBX manufacturers are still struggling with the intricacies of data support for single terminals. The concept of multiple virtual connections over the same access line is beyond their immediate concerns.

However, the movement toward more sophisticated terminals that require flexible communications facilities has accelerated significantly over the last 12 months. The advantages of the virtual connection approach will become more obvious as these intelligent devices dominate the communications requirements. There are several applications that benefit from the flexibility of virtual connections:

In spite of the progress that was made by the Phase II PBXs toward integrated voice/data handling, these systems are still dominated by the voice-switching requirements.

are well-understood, and efficient system engineering guidelines exist to minimize their impact.

The real-time, high-throughput requirements of a pulse code modulation-encoded voice bit stream will require the handling of voice samples on a higher priority level. This can be accomplished by giving the pulse code modulation samples priority on the local access line while a voice conversation is in progress. The entire local access bandwidth can be used by other applications when the telephone is idle. Similarly,

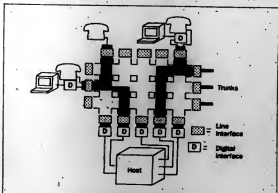


Figure 4. Packet-switched X.25 support

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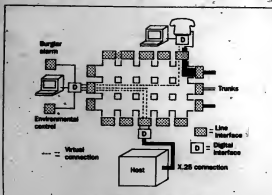


Figure 5. Multifunction terminal support

X.25 support. X.25 has been recognized in the data communications industry as the most efficient interface for data connections. A PBX that supports virtual connections is able to support X.25 very effectively. In particular, virtual connections switch data already as packets, which is the format generic to X.25 (see Figure 4 on ID/12). X.25 converters, required for a circuit-switched communications system, perform a packetizing, depacketizing, concentration and, possibly, protocol conversion function. This approach, which is used by Rolm, Northern Telecom, AT&T's Information Systems and others, works if

only a few X.25 connections are required. The converters tend to become a cost/performance bottleneck if many X.25 connections (more than 100) are to be switched.

Multifunction terminals, intelligent workstations and personal computers have the inherent capability of doing several tasks at the same time. The traditional concept of "one user — one conversation" is inappropriate for these terminals because they can participate in several communications activities simultaneously. Therefore, the PBX must provide these terminals with the ability to establish multiple connections in parallel.

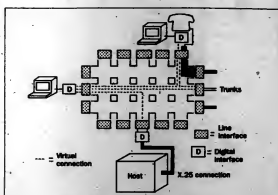


Figure 6. Virtual connections for new services

The total communications capability should be limited only by the bandwidth of the access line, not by a protocol limitation that restricts nonvoice connections to one at a time. The concept of multiple windows, which is now penetrating personal computer software applications, must be supported by multiple communications paths to work effectively in a communications environment (see Figure 6).

New services. There are many building applications that have small but periodic bandwidth requirements (fire alarm, burglar alarm, energy control such as heating, lighting, air conditioning). Virtual connections allow the monitoring and controlling of these applications to continue while other data connections are in progress. (You don't want to have your smoke detector alarm message waiting until you have finished reading your electronic mail.)

Virtual connections allow the addition of these services to the existing communications facilities without any new wiring or line cards at the PBX. The same is true for having more than one terminal served by a single access line. Again, the limitation should be the total bandwidth of this line, not a protocol that dedicates the entire bandwidth to a single connection (see Figure 6).

Polling. Many applications require the collection of information at a central point. Polling is the process that the central system uses to transfer the required information from the remote stations into a central data base. This polling process is very inefficient if the central system continuously encodes busy conditions at the target terminals because these terminals have some other communications activity going on at the same time.

Every busy condition requires a retry, which results in a waste of resources and potentially long delays. Virtual connections solve the "busy condition" problem, because they allow multiple activities to be served in parallel.

Transit switching. More and more applications require multiple PBXs to work together effectively in a network environment. This means that the PBX needs to perform transit-switching functions. Therefore, the PBX's task is not only to provide flexible local communications but also to optimize the use of long-distance facilities.

While the merits of virtual con-

nections for local communications may not be understood, there is no doubt about their advantage for long-distance operation. The multitude of public packet-switching networks now in operation proves this point. For a PBX to act as a transit switch for data communications, it is imperative to switch virtual connections (or packets) effectively. The use of packet/circuit converters to accommodate X.25 interfaces is un-

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Permanent virtual connections avoid the cost and delay of setting up and tearing down these connections.

acceptable in this application because of performance and cost reasons.

Permanent virtual circuits. Since virtual circuits do not use transmission or switching bandwidth while the connection is idle, there is only a small penalty to pay in terms of memory usage if virtual circuits are established permanently. This approach works very well if many short connections to only a few destinations are required. Permanent virtual connections avoid the cost and delay of setting up and tearing down these connections.

The evolution of integrated voice/data PBXs has progressed rapidly during the last few years. From a situation where modems were the only option available to the user, we have advanced to the point where data is now transmitted and switched in its digital format. With the introduction of PBXs that support virtual connections, we have now reached a point where PBXs support voice and data switching equally well. At last, PBXs are not dominated by voice switching any more.

About the author

Holger Oppderbeck is vice-president of Advanced Communications Development at GTE Business Communications Systems in Menlo, Pa. He is responsible for the development of GTE business terminals, office automation products and the next generation of integrated voice/data switches.

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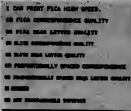
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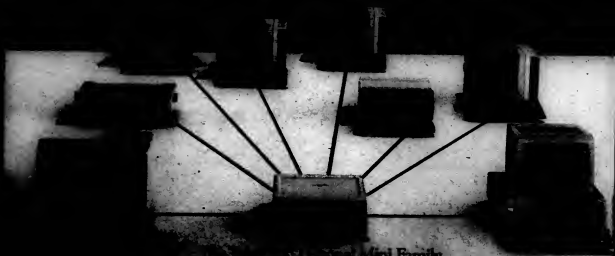
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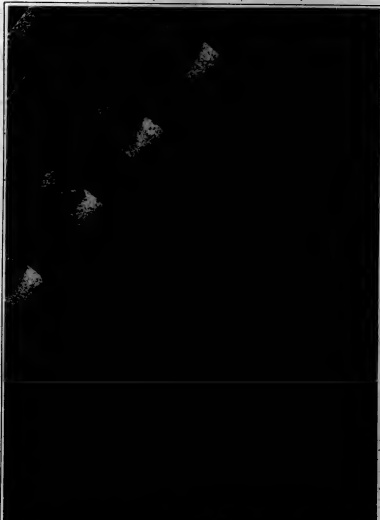
COMPUTERWORLD

Special Report

February 25, 1985

Communications Networks

Making the connection



A photomicrograph of electronic circuitry conductor paths currently used by AT&T in the production of advanced communications systems.

Bell Laboratories photo

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Centrex: the PBX alternative

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T1 takes off

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Setting telecommunications standards

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Centrex service on the rebound

INSIDE



Bob Lichtenstein photo

Centrex is flourishing despite private branch exchange competition. **98/2**

It is taking off — \$353 million in sales are expected by 1988. **98/4**

The fiber-optic cabling market is growing as the telecommunications industry moves toward distributed DP. **98/5**

An electronic mail system is allowing a firm's word processors and personal computers to talk with each other. **98/6**

Local-area networks, value-added nets and wide-area nets: a look at their similarities and differences. **98/6**

While Europe continues to move toward Integrated Services Digital Network standards, terrestrial and satellite networks are supplying current communications needs. **98/10**

A freight-forwarding firm is supporting its business growth with a satellite communications network. **98/13**

The AT&T divestiture and greater market sophistication has fueled demand for private long-haul communications. **98/14**

Creating a corporate decision-making forum can help overcome fear of local-area networking. **98/18**

A network of twisted-pair wire is helping an engineering contracting firm meet the DP demands of its mobile work force. **98/20**

With devices known as data-over-voice modems, firms can take advantage of installed telephone wiring to connect their DP equipment. **98/23**

The Open Systems Interconnect reference model has provided a standard for networking interconnection. **98/28**

Satellite links are providing corporations with reliable, efficient and secure data transmission. **98/30**

A U.S. Department of Energy contractor is cutting circuit costs and finding remedies for communications problems with a multiplexed network. **98/30**

Network management software can provide the key to network control. **98/32**

Protocol conversion and access to IBM's Systems Network Architecture are important for network managers. **98/30**

By John Dile
Our Staff

Contrary to earlier predictions, AT&T's divestiture and the implementation of access-line charges have not led to the wholesale abandonment of Centrex, a communications service offered by local telephone companies that provides telephone features similar to private branch exchanges (PBX).

Centrex has not only survived 1984 but also has flourished under renewed attention from the former Bell operating companies, which have begun to enhance and market the service actively. The divested Bell operating companies — now allowed to market but not manufacture telecommunications equipment — have come to see Centrex, once viewed as an aging service, as a revenue source that can be better exploited.

Like PBXs, Centrex is used in providing basic telephone services, what is known in the industry as "Pots" — plain old telephone service. The difference between using Centrex and PBXs is the location of the switching equipment. Whereas PBXs are on the user's premises, Centrex services are located at local switches, called central office switches, used in the backbone of the local telephone network.

With Centrex, every telephone within a company is supported with twisted-pair wire that runs back to a telephone company central office switch. Therefore, even internal calls from one extension to another have to be routed out to the switch and then back into the office. PBXs, on the other hand, are installed within a user's building, providing intercom or internal calling without requiring the call to be routed externally.

Because a good percentage of all calls are within the building, users with PBXs need only a few trunks to connect their private switch to the local telephone system. Generally, PBXs have a trunking ratio in the range of 1:10 or 1:15, where one trunk can be used to support 10 to 15 phones. This became an important difference between Centrex and PBXs when the divested Bell operating companies imposed Customer Access-Line Charges (CALC) last May.

Business Case rises

When the business case was investigated, users began paying an average of \$5/line/mo for every trunk they used to connect their PBXs with the local phone system, according to a Federal Communications Commission spokesman. Because of the service's nature, Centrex calls were priced differently. Centrex costs the user \$2/line/mo for lines put in place before July 1984 and the regular business case for lines installed thereafter.

With a 1,000-station system, for example, a PBX user with a 1:10 trunking ratio now pays roughly \$600/mo in access fees, varying by state. A Centrex user, on the other hand, now pays \$2,000/mo in access fees: \$2 for every line or station supported. These figures led many analysts to the presumption that users

would turn down Centrex in favor of PBXs.

But that has not happened. "Not only is Centrex not losing ground to PBXs just now, it is actually on the rebound," said William Rich, a telecommunications analyst with Northern Business Information, a market research firm in New York.

According to Rich, roughly 12,000 Centrex systems representing 5.1 million lines were in place by the end of 1983, up 13% from 1982. In 1984, the installed base of lines grew an estimated 2% to 4%. Interestingly, large Centrex users represent the majority of lines installed, whereas the majority of systems installed are fewer than 100 lines in other words, 5% of all Centrex users — customers with systems of 2,000 or more lines — account for 40% of lines installed to date. Only 12% of all Centrex users account for nearly 70% of the installed lines, Rich said.

Centrex business has not fallen off as predicted because, even at the higher price, the cost of jumping too often could be greater than the added access charges. "Users are looking at their options and saying, 'Let's not be in too much of a hurry; let's take a look at what we have and make a move in a more restrained manner,'" noted Jeff Kaplan, a senior market

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The divested Bell operating companies have come to see Centrex, once viewed as an aging service, as a revenue source that can be better exploited.

analyst with International Data Corp., a market research firm in Framingham, Mass.

Users' hesitancy is fueled by the confusion surrounding PBX marketing — third generation vs. fourth generation and so on — and the interesting things the divested Bell operating companies are doing with Centrex, Kaplan said.

That aside, many Centrex customers never saw the access charges. Faced with the requirement to charge their user base \$2/line/mo, some local telephone companies lowered their basic rates so that in effect the customer would not see the increase. Still others adopted PBX trunk equivalency pricing, reworking their tariffs so that Centrex users would pay the same amount of access charges as typical PBX users. A 1,000-line Centrex customer, for example, would pay the equivalent of 100 trunks, assuming an average 7:10 PBX trunking ratio.

The method of dealing with access charges varies by telephone company and by state, Rich said. New England Telephone Co. for instance, has been generally successful in convincing the public utility commission in the many states it serves to let it adopt trunk equivalency pricing. New York Telephone Co. is said to be looking at offsetting access charges altogether by lowering its rates. The utility commissions in U.S. West's territory — the regional holding company that serves the single largest number of

states: Oregon to Iowa, New Mexico to Montana — are said to be the most progressive in allowing price changes.

Pacific Northwest Bell Telephone Co., a subsidiary of U.S. West, has adopted PBX trunk-equivalency pricing, but that is not what is retaining current Centrex customers or attracting new ones, according to Theresa Loft, product manager of the company's large central office services. Flexible pricing, option packages and rate stability, make Centrex attractive, Loft said.

Variations of one theme

Pacific Northwest Bell offers Centrex, Coreflex and Corecom, all variations of the same theme, differing by pricing structure and packaging. Corecom is aimed at larger users with 200 or more stations. Last year, the first year the service was offered, 30% of Pacific Northwest Bell's Centrex user base converted to Corecom.

According to Loft, Centrex has traditionally been a price-averaged service, where all users pay the same regardless of what it actually costs the company to provide the service. Corecom is priced on a customer-specific basis.

"We evaluate several areas to determine the costs involved," Loft explained. "We look at how far they are from the central office that serves them, study their call volumes, look at the names listed on the business and at internal calling habits, consider what features they universally use and then package the service and offer them a contract of three or more years for those services."

One feature available is a simulated trunk facility — a software choice that enables a communications manager to configure Corecom as though it were a PBX. The option essentially enters a degree of blocking to Centrex, creating a situation where, as with a PBX, a user may not be able to make a call because all the trunks to the local phone company switch are busy. The manager can set thresholds so that when the calling volume for incoming and/or outgoing calls reaches a certain level, additional calls are blocked. This enables the user to control traffic and costs, Loft said.

Although customer-specific pricing in some cases results in savings for the user, most of the time, customers will get a minimal or no change in price. Loft cited this fact as support for her contention that Centrex loyalty and interest is not necessarily based on finances. Customers are attracted to features like the simulated trunk option, she noted, but may find the long-term contracts that offer rate stability one of the most appealing features of Corecom.

Other divested Bell operating companies have made strides in enhancing Centrex, but the type of services they offer and the names under which they are marketed vary from company to company. The divested Bell operating companies, however, can choose from a common pool of hardware and software Centrex

Special Report

despite access-line rates, PBX competition

enhancement products that independent companies manufacture. AT&T Technologies — a natural supplier of add-on products, given that it developed the switches that are used to provide Centrex — offers a host of Centrex products.

One feature in the works at AT&T is a simultaneous voice/data feature. Using data over voice technology (where the two signals are transmitted at different frequencies), users reportedly would be able to send data asynchronously at speeds up to 9.6K bits/sec while simultaneously using their telephones, according to Richard G. Sanders, product manager of AT&T's local space division switching systems.

Using what Sanders called a limited-distance data set that is either integrated into the phone or is sitting next to it, users can route data out to the Centrex central office switch. From there, the data can be either turned back to another device within the user's building or routed outside the Centrex group to a bank of shared modems. Modem pooling at the central office relieves the need for each individual to have a modem. Sanders estimated that the limited-distance data set would cost several hundred dollars.

AT&T has also developed a number of software packages for use on its line of 3B computers that, when placed on the user's premises, provide Centrex management and control features. Collectively known as the Advanced Communications Packages, they include the following:

- Centrex station rearrangement, which enables a customer to move his own phones around and change extension numbers.

- Station message detail recording, providing real-time access to billing data for each user.

- An on-premises message desk or message center.

- Facilities management, enabling the communications manager to monitor the status of the service by accessing the various traffic accounts.

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AT&T has developed software packages for use on its 3B computers that provide Centrex management and control features.

centers stored in the central office switch.

- An electronic directory function that enables a console operator to type in a name to find an extension.

The 3B that is needed to support these applications (3B Model 2, Model 5 or one of the Model 20s) varies by customer. Sanders said a number of locations are already using these features. Excluding the cost of the computer, the software packages range in price from \$2,000 to \$2,600.

Another development in the works at AT&T is Netrex, which is a city-wide Centrex. Netrex would enable

a local phone company to offer large businesses with multiple locations within a given metropolitan area the ability to operate several Centrexes as a single service, Sanders said.

With Netrex, instead of having each location served by a separate Centrex, or some by Centrex and some by PBXs, all locations would appear to be serviced by one large switching entity. Netrex would eliminate the need to dial an access code and then a seven-digit number to call an affiliated branch; instead, users could place those calls by dialing a four-, five- or six-digit number, depending on the numbering plan. Sanders said all calling options would

be operated normally.

Even with the pricing options, features and packages becoming available, Centrex is not for everyone. "Some larger customers are dropping Centrex in favor of PBXs because they can get more technically advanced systems," noted Northern Business Information's Rich. The PBX purchase is also sweetened by the fact that users can get investment tax credits. "But a lot of people don't need anything more than basic [plain old telephone service]," Rich said. And for that, Centrex is more than on par with PBXs. After all, when it breaks, it isn't the user's problem.

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Special Report

T1 exhibits explosive growth; \$353 million in sales

By Robert Bauer
Special to CWI

In 1983, the commercial use of T1 exploded. That year, the industry sold some \$30 million worth of T1 multiplexers. Last year's sales totaled \$40 million. In the next few years, major enhancements to T1 equipment will mean continued explosive growth.

T1 is a service offered by AT&T Communications that transfers either voice or data at 1.544 Mbit/sec over coaxial cable, optical fiber, digital radio, microwave or satellite. Terrestrial service is provided under the name AccuNet T1.5, while satellite transmission is available through SkyNet 1.5.

Many companies offer items called T1 products. These products are, in fact, multiplexers that permit anywhere from 24 to 128 channels on a single line.

The market expands

Dataquest, Inc., a market research firm, estimates that 1,300 T1 multiplexer units were shipped in 1983 with an average sales price of \$23,000, and the firm estimates that some 2,500 units were shipped in 1984.

The reason 1983 seems to be the starting point for commercial T1 service is actually rather simple. There was a severe shortage of facilities until then. Prior to 1983, the T1 cable took a long time to get and was, for the most part, limited to campus environments and local links. When AT&T introduced AccuNet, the market took off.

In fact, Dataquest estimates that from the \$40 million in sales for 1984, there will be a compounded annual growth rate of 55.7% for the next four years. That translates to about \$353 million in sales by the end of 1988.

Dataquest's estimates for shipments of T1 multiplexers show a 42.8% compounded annual growth rate from 1984's 2,500 units to a total of 10,400 units shipped in 1988. The growth rate for numbers of units shipped is a little lower than the amount of revenue.

There are several reasons for the projected rapid growth in the T1 market. The tremendous increase in the use of on-line terminals, intelligent workstations and personal computers is not going to change any time soon. The projection is that there will be at least one terminal per worker by the 1990s.

Further, terminal speeds continue to increase dramatically. That means there is an increasing demand for high bandwidth, which in turn leads to more flexible and efficient multiplexers.

Another reason is that T1 facilities are more available than ever. The amount of plain wire that is available from the telephone companies has increased because they are using multiplexing to get more out of their facilities.

It is estimated that by 1990, there will be some 100,000 new fiber spans

available. Each fiber span can carry about 300 T1 links. That works out to about 30 million potential T1 spans available for use by 1990.

In addition, T1 has benefitted from attractive tariffs in the last year or so. For example, a T1 link be-

tween two locations costs about the same as three 56K bit/sec links. A single 1.544 Mbit/sec link costs approximately the same as 10 ordinary telephone voice-grade lines, which typically operate at speeds of around 9.6K bit/sec. In very short-haul situ-

tations, the cost for a T1 link is almost equivalent to the cost of a single 56K bit/sec line.

Projections indicate that the cost for T1 multiplexers will increase during the next four years. That projection is based on the increased complexity and sophistication of these devices.

Today, virtually all of the T1 multiplexer-installed base is point-to-point traffic. Some multiplexers, however, have drop-and-insert capability, where a channel introduced at one end is dropped out at one of the other multiplexers in the configuration, and another channel is introduced there to continue through the network.

Forte introduces



Bauer is vice-president for marketing and development at Infotronics Systems Corp., a data communications equipment designer and manufacturer based in Cherry Hill, N.J.

Special Report

seen by '88

Networking is clearly the wave of the future. In fact, Infocore Systems Corp. projects that by the end of 1986, 70% of the total T1 market could be used in networks, rather than point-to-point applications. This development will see the importance of price, which is significant in point-to-point applications, become secondary to network management and control capabilities.

Consequently, more functionality will be built into T1 products. More devices will be software driven, as opposed to current units that are purely hardware driven. All of this will result in improved flexibility when configuring and controlling T1 networks. Further, such things as dy-



By 1988, T1 revenue will increase by 55.7%

namic bandwidth allocation and circuit switching between nodes at T1 speeds will be seen.

In the future, network manage-

ment will be increasingly important and it is possible that networking at T1 speeds, where users will have more than one link between two



T1 product shipments will soar by 1988

points, is approaching. To that end, redundant paths are going to become more important.

Finally, there is a pronounced move toward better quality compressed voice. Typically, voice was passed over the facilities at 64K bit/

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Most T1 devices used now are called first generation. They're characterized by point-to-point configurations and hardware control.



Second generation T1 equipment now available offers more complex configurations like line drop and insert and software control.



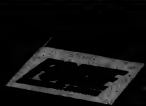
Third generation equipment is characterized by T1 networking, higher quality voice and a requirement for network management.

sec. But high-quality voice at 32K bit/sec techniques are increasingly being used.

The T1 marketplace has come a long way. From its first use more than 20 years ago by telephone companies for economizing line usage, its commercial use has exploded. The T1 market has only just begun to move.

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Special Report

Fiber optics comes of age in telecom

Importance of communications efficiency spurs movement

By John Powers
Special to CWA

Fiber optics is the hottest item in telecommunications today. This is primarily because of the migration in data transmission industries to a more distributed data processing environment. Also responsible for the trend is the increased importance of efficient communications between computers and expensive peripherals such as file servers, high-speed printers and disk drives.

Data processing and office automation planners had a universal problem with distributed data pro-

cessing applications prior to the use of fiber optics as a transport medium. The further away the user was from the computation source, the less performance one could expect from the workstation or terminal device.

As the move toward developing higher speed workstations continues, greater bandwidth will be needed for additional connectivity.

Data communications managers are already forecasting the moment at which users could exceed the bandwidth of either twisted-pair copper or RG-62 coaxial cable attached devices. Fortunately, fiber-

optic technology has matured to the point where it is a stable and mature information transport medium for many of the data communications applications needs of today.

Growth of fiber-based applications has been in two major areas—telephony and local-area networks. In telephony, private branch exchange vendors have used fiber optics in their systems designs to enable the modular distribution of the switching system over a geographically dispersed area such as an office park or a college campus.

Fiber-optic links provide the nec-

essary bandwidth to support integrated and simultaneous voice/data transmissions while providing inherent immunity from moisture, radio frequency interference, electromagnetic interference and cross-talk conditions prevalent in conventional copper wires.

One of the most important benefits derived from the use of fiber optics in the telecommunications industry has been the price/performance of fiber optic over conventional copper cable. Without launching into a dissertation on the transmission properties of copper, let us examine the bandwidth of a conventional 900-pair copper cable vs. a two-strand fiber cable.

A 900-pair cable is capable of handling 900 simplex (one-way) communications at speeds up to 19.2K bit/sec for an aggregate bandwidth of 17.28M bit/sec. A single pair of fiber-optic cables produces 836 1.544M bit/sec T1 circuits resulting in 8,064 channels of communications at 64K bit/sec or 560M bit/sec each.

Diameter of a soap can

Using wavelength multiplexing techniques available today, the circuit yield of the single-pair fiber-optic link can be increased to approximately 24,192 channels of communications at 64K bit/sec each, at a cost equal to—or less than—the installation of the 900-pair conventional copper cable. For this almost hundred-fold increase in capacity, it is interesting to note that the diameter of a 900-pair cable is equal to the diameter of a soap can, and the fiber cable, including its shielding and protection, is the diameter of a pencil.

In certain applications, such as shared tenant and high-rise buildings, the size and weight advantages of using fiber vs. copper cable have been dramatic. Using our 900-pair copper cable example, this cable has a weight of approximately 4,800 lb per 1,000 feet. The single-pair fiber cable has a weight of approximately 80 lb per 1,000 feet.

Size, weight, bandwidth and immunity to electrical interference ensure that fiber-optic cables will be an important factor in building construction and renovation in the future.

With the increased demand for higher performance workstations and peripheral devices in a distributed data processing environment, more time is spent in the planning and implementation of the data

See POWER 58/13

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Powers is vice-president of Telecommunications Management Corp., a Dayton, Ohio-based telecommunications consulting firm.

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Special Report

Electronic mail software links Nabisco's varied systems

EAST RANOVER, N.J. — In a statement on office automation last year, Nabisco Brands, Inc.'s corporate management committed the firm to two types of office equipment that could not communicate with each other.

According to the statement, Nabisco would move toward installing IBM Personal Computers but would maintain its current base of Wang Laboratories, Inc. word processors.

"Our needs now are more in analytical and management functions within operations and not in strictly secretarial-type functions," according to L. J. Callaghan, the firm's manager of analytical services.

But even with the move toward

micros, the firm wanted to continue to benefit from its investment in word processing machines.

With its direction defined, Nabisco looked for a way to get the different machines to talk to each other so that it would not have to replace its original computer systems, retrain its staff or change its future corporate networking plans.

Nabisco makes and markets Planters' peanuts, Life Savers candy, Fleischmann's and Bluebonnet margarines, Royal desserts and other foods.

When the firm first installed of-

fice automation systems in the 1970s, it viewed the machines primarily as a way to increase secretarial productivity, according to Callaghan.

Because Wang's OIS and VS systems were ideal for these needs, Nabisco purchased a number of them, he said. The company also invested in training users to operate the systems and to use Mailway, Wang's electronic mail system.

Today, more than 300 Nabisco secretaries use Mailway to send documents among 21 Wang word processing systems. The firm uses a number of different Wang models, ranging

from OIS 50s to VS 100s, which are installed in locations throughout the country. The remote word processors communicate via modems and telephone lines.

When the firm decided last year to invest heavily in IBM Personal Computers, it wanted to maintain a viable electronic mail system. Nabisco has more than 300 Personal Computers installed, 160 of which communicate with the firm's two IBM mainframes — a 3085 and a 3081 — through Digital Communications Associates, Inc. Irma boards that allow them to appear to the mainframes as 3270-type terminals.

Electronic mail had to accommodate data transfer between micros and mainframes, between micros and word processors and among word processors. The company considered using protocol converters, but found that the devices provided only one-to-one solutions, Callaghan said.

He explained that Nabisco would need a separate protocol converter for each type of communications between devices.

"When you are attempting to send as much electronic mail as we do, it is not the most effective solution," he said. At Nabisco, employees exchange between 60 and 75 pages of text per day.

After it looked at other communications options, Nabisco purchased Transnet communications software from Network Applications, Inc. The software, installed on the firm's 3081, accepts messages from Mailway and stores them in TSO mailboxes.

Receiving messages

Personal Computer users check their mailboxes, then ask Transnet to send them the message they want. The software transforms a message's character set to one that a 3270-type machine can accept and sends it on to the user.

"Transnet provided a link between the [Personal Computers] connected to the mainframe and our Wang OIS and VS workstations," Callaghan said. "It also required no retraining because we could continue to use Wang Mailway's addressing scheme."

Nabisco brought Transnet live in December 1984 and has given 12 Personal Computer users access to electronic mail through the software. The firm plans to bring additional users onto the system gradually, department by department, and ultimately connect about 100 micros.

The firm has had response-time problems with the software, which has taken between two and three minutes to transfer documents from Wang to IBM machines. "But when you consider that regular mail takes two or three days," Callaghan said, "two or three minutes is not all that bad." The software vendor has prepared a new release that Callaghan said he expects will solve the problem.

Nabisco is considering a move toward IBM's Professional Office Systems (Profs) and Distributed Office System Support (Diosas) in the future. Callaghan said these will not pose a problem for the firm's electronic mail setup because Transnet supports both Profs and Diosas.



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Special Report

Consider design when choosing a communications net

By James B. Witherman
Special to CWS

During the 1960s, choices for the data communications manager have proliferated as never before. Pioneering activities by the newly competitive AT&T, the newborn local operating companies and their competitors make life both complex and demanding. No longer can managers responsible for the planning and implementing of data communications depend on the telephone company to provide an optimal network.

The choices available for data communications require a structured approach to the design of communications networks. These choices basically fall into the following three areas:

- Local-area networks.
- Value-added networks.
- Wide-area networks.

Two types of architectures meet the need for communications. Local-area nets meet local communications needs, while wide-area networks meet remote needs. The value-added networks are a subset of wide-area networks that meet specific needs of traffic density and dispersion.

A local-area network permits locally attached devices to communicate, usually at speeds above 100/sec, to one or more computers. Its most attractive feature is universal connectivity at very high speeds and easy terminal movement. The negative feature of local-area networks at this point is their complexity and high cost per connection.

For IBM networks, a local-area net must be Systems Network Architecture (SNA)-compatible. SNA offers the multiple machine access promised by local-area networks. SNA even uses coaxial cable for most of its local communications, similar to local-area network cabling requirements.

The major distinction between local-area networks and an SNA network implementation is that SNA is a tree hierarchical structure, while most local-area networks utilize a bus or ring topology, although many broadband local-area networks have adopted a tree structure for running coaxial cable throughout a building.

Another local-area network distinction is that most users have adopted some form of access method utilizing contention with error correction, such as the widely used contention system multiple access/collision detection.

IBM's future local-area network is frequently a topic of discussion. Although the product has not yet been announced, observers anticipate that IBM's local-area net will run on twisted-pair wiring with possible fiber-optic implementation. The topology proposed is a ring structure, and the expected access method is known as token-passing, which would easily complement the polled terminal architecture embedded within SNA.

It is expected that IBM will announce its local-area network in late 1985. The net's cost is not yet known. It is interesting to note, however, that IBM recently acquired many equipment components from Sytek, Inc., one of the best known broadband local network vendors, and is using these components for networking the Personal Computer. It is not known if this indicates a desire to change their local-area network architecture for mainframes.

To select a local-area network properly, the communications planner must first determine that a need exists for the speed and connectivity that a local-area network provides. If traffic topology is important for general communications analysis, it is doubly important for local-area network selection. Furthermore, for IBM users, the SNA environment requires that any selected vendor be able to demonstrate SNA compatibility for SNA devices that will communicate over the local-area net.

This capability is becoming increasingly available from many local-area network vendors. It is

not necessary to wait for IBM's local-area network before making a local-area network decision. However, if a clear need does not yet exist for a local-area network, it is certainly wise to wait until the parameters and cost of the IBM local-area net are known so they can be factored into such a decision. For any local-area net selected, be sure that it is compatible with your computer hardware.

The 1970s saw the emergence of the value-added network, a new kind of data transmission service that was particularly well suited to connecting widely dispersed users with one or many computers. These value-added networks used a new kind of transmission called packet switching. Packet switching enabled value-added networks to carry many different users' data in packets, which provided more optimal use of transmission facilities than the usual procedure of dedicating a circuit to a given user.

With these economies of scale, it became possible by the use of virtual circuits, to provide service to lower density locations and scale money at the same time. Note, however, that making money has been a persistent problem for most of the commercial value-added networks.

It has been clearly demonstrated that for interactive traffic, packet switching is the most efficient transmission scheme available. From this technology, the value-added networks have offered virtual circuits for users who wish to switch traffic from many different locations to their hosts. By using the X.25 packet-switching standard, developed by the European Consultative Committee on International Telephone and Telegraph, it is possible to consolidate traffic from many low-speed users into one high-speed line, thus gaining much operational efficiency.

This technology is very applicable for networks with lower density users who do not require private-line access. A value-added network can reduce the dial-up costs of serving users, while at the same time reducing their long-distance telephone access costs. Furthermore, value-added networks are beginning to offer asynchronous-to-SNA conversion, which makes them more attractive to IBM networks. IBM users have avoided value-added networks in the past, because of this problem.

For IBM users considering a value-added network, however, two considerations must be taken into account:

- First, any value-added network service being considered for use with an IBM system should be SNA-compatible.
- Second, value-added networks are compatible with IBM's Binary Synchronous Communications (BSC) protocol and also for SNA compatibility.

If second, IBM has made X.25 access available on their communications controllers, via an interface. It should become easier to interface any desired value-added network services to an IBM host. If the interface is not an option, there are other, possibly more cost-effective, ways to get X.25 compatibility from other vendors.

For the long run, as traffic needs increase, private value-added networks can also be procured from several vendors. Private value-added networks are an increasingly attractive option as users find their network needs expanding. It is also possible to use a composite of private and public value-added network services. But that brings us to our next and last service to consider.

As stated earlier, both local and remote communications needs can be developed once the corporate information flow is considered. Just as local-area networks deal with the local data traffic flow, long-distance traffic needs have been grouped into a category called wide-area networking.

In fact, any collection of data communications facilities is, technically speaking, a wide-area network. A centralized host serving multiple IBM terminals can be a wide-area network.

The only relevant issue is whether to remain centralized or to disperse networking closer to users. In fact, the more wide-ranging issue is whether or not users with a multiplicity of network needs, from dial-up to dedicated, centralized or dispersed, can have all their needs met by a single overall communications architecture.

If it can be determined how economies of scale merit such a unified approach, then the effort is worthwhile. It would certainly be more appropriate for any data communications network planner to consider the need for a unified architecture. An analysis of estimated traffic flow encompassing all applications is an absolutely crucial part of such an architectural analysis.

Once a traffic analysis and a traffic matrix are developed, the architectural issues can be addressed. Wide-area network options range from circuit switching, with concentrators and multiplexers strategically located, to private packet-switching networks for handling a multiplicity of traffic types with transmission facilities, including high-speed microwave or satellite links.

To select a communications hardware architecture properly, a major effort must be undertaken to solicit bids from various communications equipment vendors.

The major constraint on this process is the need for any selected network architecture to be compatible with the corporate computer architecture. While many products are only BSC compatible today, more are addressing the issue of full SNA compatibility.

Another constraint imposed on IBM users is the outright ban on the use of BSC circuitry, and the caution that must be exercised if and when Synchronous Data Link Control links are placed on a satellite. With proper buffering and adequate data block storage capacity in the terminal controllers and communications controllers, satellite links can be very cost-effective for high-volume traffic. This should be evaluated quite carefully.

There are two key factors in developing a successful network plan. First, know what is available. The options have briefly been touched on above. Second, and almost more important, know the networking traffic requirements of the corporate computer environment. This is sometimes known as the internal information flow requirement.

The most effective way to control information flow is to establish a strategy, coupled with specific objectives, before expansion occurs. This requires a plan. This plan must consider more than what technology is available or cost-effective.

If corporate control of the flow of information is to be achieved, then information flow requirements must be anticipated, and the application of technology to those requirements must be designed for in a specific, coherent fashion.

In order to ensure sound design for both new and existing applications, user needs must be evaluated. The best way to achieve this is via top-down analysis of information access requirements. If this is done for all departments within a company, a coherent plan for user equipment utilization and needs can be developed. From the total information flow matrix for all departments, both equipment requirements and networking configurations can be determined.

In short, before a network can be designed, the traffic must be fully determined. The optimum network topology will be determined by the traffic matrix. From the traffic and topology requirements, vendors can then be solicited, and a network architecture that will be both cost-effective and compatible with the computer architecture can be installed.

Special Report

Europe focuses on public ISDN, extending satellite nets

By Steve McVittie
Special to CWS

The data transmission approaches in the United States and the European Economic Community have been historically quite different.

For instance, telex use, although no longer increasing, remains an important and common way to communicate short messages in Europe. For small businesses, telex machines are still the second communications device after the telephone.

Nevertheless, telex is quickly being replaced by facsimile, electronic mail systems that use packet networks as a backbone network and, in the near future (1986), the Telexnet service.

This last service, Telexnet, will use existing telephone and packet networks with an interface to extend to the telex network. It is expected to overcome the incompatibility between word processors from different equipment vendors and standard communications. Working at 2.4K bit/sec, a letter will be sent from desk to desk in 10 seconds.

For data transmission itself, for instance from CPU to CPU, public packet networks serve as the backbone of European networks. The X.25 packet network technology was used first with the Barent network in the '70s and was followed closely by the development of highly used domestic networks, such as Transpac in France, which had more than 20,000 direct connections at the end of 1984; Datanet in Germany; BPSS in the UK;

and Iberpac in Spain. Use of X.25 packet network technology provides high speed, flexibility and control for better cost/performance ratios.

It is clear now that the objective of telephone companies in the U.S. and Postal Telephone and Telegraph (PTT) authorities in Europe is the implementation of an Integrated Services Digital Network (ISDN). Pilot services will start in most European countries in 1985-86, with a forecast for public service in the 1986-90 time frame and with national coverage by 1996.

By 1986, 95% of France will be covered by an ISDN. Three million ISDN lines at 144K bit/sec will be installed (as well as higher speed ISDN lines).

At this point in Europe, however, compatible terrestrial and satellite networks have been integrated to respond to communications needs.

For instance, in terms of speed, multiples of 64K bit/sec up to 2M bit/sec, are available now in France for data applications. Alternate communications routes, either terrestrial or satellite, over two compatible digital backbone facilities and a large number of direct connections or satellite antennas add flexibility.

The networks are controlled by direct connections between site locations and the control center of the network. Since 1977, 17 European countries have been cooperating on a regional basis to develop satellite communications throughout Europe. The European telecommunications satellite organization, Eutelsat, was established for that purpose and is now in full operation.

Eutelsat's main shareholders are France (16.4%), the UK (16.4%), Italy (11.5%) and Germany (10.8%). The main objectives that Eutelsat

has set down are as follows:

■ To strengthen the terrestrial networks for carrying intra-Europe and international public telecommunications traffic between main international exchanges.

■ To provide a new means (other than microwave) for television program exchanges, coordinated by the European Broadcast Union.

■ To provide a satellite multiterminal system in Europe.

Within this last service the French Telecom 1 satellite will play a role in the realization of a digital switched network system throughout Europe.

The space segment of Telecom 1 is composed of two satellites with six transponders each for the Ku-band Telecom 1 3-meter antenna coverage of Europe, with a capacity of 25M bit/sec per transponder. On the Telecom 1A bird, which was launched in early August and became operational as of Dec. 1, 1984, one transponder is dedicated for European digital communications, one is leased by the German

Bundespost (the German PTT), three are dedicated for French domestic use and the remaining transponder is dedicated to analog videconferencing.

Apart from this last transponder, the system is a fully digital Time-Division Multiple-Access/Demand-Assignment network.

An extensive ground network has been developed with a capacity of 300 11-ft transmitters and receive earth stations for the digital services and a mobile fleet of six-ft television receive-only earth stations for analog teleconferencing. Future applications for Telecom 1 services include decentralized computer-aided design and manufacturing, picture distribution and teleconferencing.

In conclusion, European networking technology will continue to progress and move toward ISDN standards in coming years. As expected, new technologies will play an important role in the European networking grand plan.

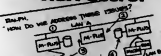


Photo by M. De Villepin

Telecom 1 satellite

De Villepin is assistant vice-president of France Telecom, Inc. of New York, which is a representative office of the French Postal Telegraph and Telephone authorities.

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Special Report

Satellite-based network, automation help freight firm

MEMPHIS — After a decade of consistent growth led by a freight forwarder here in an information gridlock, the firm turned to automation and a satellite-based network to keep its business moving.

Since its founding in 1972, Greater South Traffic, Inc. has grown at an annual rate of 35%. Last year, the freight

forwarder moved more than 100,000 truckloads for more than 3,400 clients nationwide.

The growth strained the manual systems on which the company had relied. According to Keith Adney, Greater South Traffic's DP manager, "The company was getting bogged down in paper; it couldn't manage its information properly."

Employees, for example, had to sift through a stack of old invoices to compile profiles on client's billing status. "This type of delay detracted from other, more important areas of the business," he said.

The company's success depends on its ability to select the fastest, most cost-efficient routes available for its clients' shipments. "We're a service company in the purest sense," Adney said, "and we rely on information to run our business."

In May 1981, the company installed a 512K-byte Burroughs Corp. 1905 mainframe in its headquarters here. It brought up automated billing and load-tracking

software in January 1982 then installed terminals and other peripherals in 16 branch offices. In February 1983, it tied the system together with a satellite-based network from RCA Cyclix Communications Network, Inc.

'Ante of the potential'

RCA Cyclix had just begun to market the network technology, but Greater South Traffic felt comfortable in choosing it, Adney said. "I was fully aware of the potential of satellite communications." He considered the technology's low cost and high reliability for nationwide communications its chief benefits for the firm.

Because Greater South Traffic conducts business throughout the country, satellite communications suited the firm's budget better than leased telephone lines.

"There is no way we could afford direct or multiple-drop lines connecting all our branches," Adney said. "With a satellite-based network, the wider the area over which a user's terminals are dispersed, the greater the user's savings when compared with the cost of leasing phone lines and purchasing modems."

He did a cost analysis comparing leased-line and satellite communications and calculated that connecting nine offices with telephone lines would cost the firm \$6,000 per month more than connecting 16 offices via satellite.

But Adney said reliability, not cost, was the main reason why Greater South Traffic decided on the satellite network. RCA Cyclix provides automatic network monitoring, control and diagnostics and coordinates problem diagnosis and correction with local operating companies.

"They deal with the phone company when a line goes down," he said. "All we have to worry about is running our business."

Greater South Traffic has only two DP staff members and would need to hire a network manager if it had to monitor a network on its own, Adney said.

Problems fixed quickly

With the service, he calls RCA Cyclix whenever a problem arises, and they fix it quickly. He said that with a leased-line network, Greater South Traffic would experience longer downtimes, because the firm would have to resolve its own problems with various local telephone companies.

Uptime is a crucial consideration because employees must have speedy access to shipping data from the network. "When they are there

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Special Report

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to get information on a shipment, our network has to be working," he said. "When it's down, we're losing productivity."

Since the firm began using the network, most of its problems have been with local telephone lines that link RCA Cyclis ground stations with Greater South Traffic offices, according to Adney.

The satellite network provides data communications for the firm's 140 employees. Account clerks at branch offices have immediate, on-line access to data concerning shipping transactions.

On-line access speeds the development of bills of lading — documents that list the details of loads being shipped — and the preparation of invoices. Adney said employees can, in the same amount of time, prepare twice as many bills of lading as they did using manual procedures.

FIBER from SR/5

transport medium and methods. It is in these applications areas that local-area networks have flourished.

Although local-area networks are available in various topologies, signaling and access methods, coaxial cable is the most popular transport medium for local-area networks today. The major reason for the use of coaxial cable is its ability to passively tap into various topologies with minimal degradation of available bandwidth in baseband hertz to 10-MHz applications and broadband applications, typically between 50 MHz and 100 MHz.

Protection from obsolescence

The future of fiber optics in a local-area network environment is significant from the standpoint that it provides protection from functional obsolescence due to inherent bandwidths of up to 2 GHz per kilometer for graded-index, multimode fiber-optic cable to hundreds of GHz per kilometer for single-mode fiber-optic cable.

With transmitters and receivers ranging in price from \$100-\$400 and fiber-optic cable costing \$1-\$3 per foot for a six-strand cable measuring 100 microns internally and 140 microns externally, it is hard to ignore the cost and performance of fiber-optic technology in your data transport plan.

Data transport planning is becoming the most important task you will be addressing in the near future. The key to the success of a network will be determined by the cost, flexibility, capacity and compatibility with future technologies inherent in your network design.

The network also gives the firm the ability to monitor loads enroute to their destinations so it can report delays and revised arrival times to customers. "Our employees use the network to relay information on delays or other problems with a shipment, and we, in turn, keep our customers informed so they can plan accordingly," Adney said.

Greater South Traffic also uses the network to operate an electronic mail system that Adney designed. Users communicate office memoranda and sales and marketing information among branches; they type messages on a terminal at one location, and users at another location retrieve the mes-

sages either on screen or on hard copy.

Sixteen drops connect 95 Burroughs MT965 VDTs — 66 in the field offices and 30 at the headquarters — with the Burroughs mainframe. The company processes about 1,000 transactions per hour, with between 40 and 45 users transmitting or receiving information at any

given time.

Recently, Greater South Traffic installed six IBM Personal Computer XT's, two in its headquarters and one each at four branch offices. Employees use the microcomputers for word processing and to run spreadsheets that allocate railroad rate increases across the firm's customer base.

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Special Report

Divestiture drives demand for private long-haul nets,

By Jeff Kaplan
Special to CWR

The AT&T divestiture, improved technology and greater sophistication among major communications users fueled an enormous increase in the demand for private long-haul communications networks in 1984. Although private communications systems can save costs and be

more efficient than the public switched network, users should look before they leap at becoming their own telephone companies.

A private network, in its least complicated form, is a transmission system owned exclusively by its user that partially or entirely bypasses switching circuits owned by the local operating compa-

nies, AT&T and/or the other common carriers to transmit voice, data or video messages. However, few true private networks exist today because of their excessive costs.

Instead, variations include private lines leased from common carriers. A recent Federal Communications Commission staff report rec-

ommended that private lines leased from common carriers be considered a form of private network.

Another variation is that of privately owned systems that are intended to supplement the services provided by the common carriers. Shared service arrangements have made it economically feasible for small- and medi-

um-size companies to use private networks that they otherwise would not have been able to afford.

By adding private networks to the list of corporate communications options, network implementers can determine the most cost-effective network configuration to meet their needs, avoid fluctuating prices and use the most advanced technology available. Furthermore, as more and more vendors enter the market with new products that boast technologies with greater price/performance ratios, the user's position becomes increasingly flexible.

Survey results

A recent International Data Corp. (IDC) telephone survey of approximately 100 telecommunications managers from Fortune 500 companies and major public agencies posed a series of questions concerning private networks. Nearly 50% of the survey respondents indicated that they are currently operating what they termed a private network. Another 20% of the respondents stated that they planned to install a private network within five years.

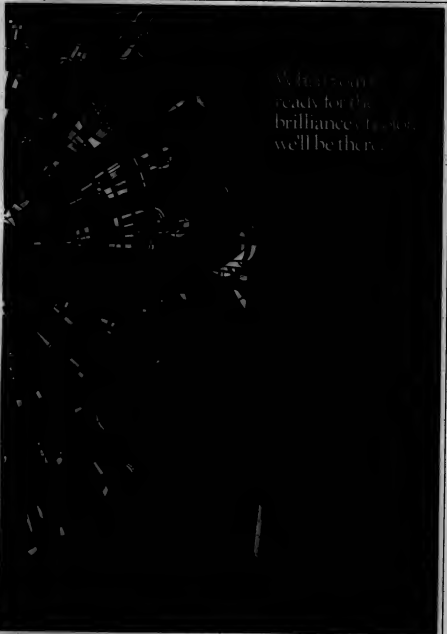
Three-quarters of the respondents with their own private networks said their systems carried more than 50% of their long-haul communications. These respondents indicated that their private networks included a combination of satellite and microwave equipment capable of transmitting voice and data messages through private channels and public networks. But it was the respondents' heavy reliance on private leased lines that resulted in such a high percentage of users claiming to operate their own private network.

The respondents identified these four fundamental problems with the public telephone system:

- Increased cost.
- Technological bottlenecks.
- Inefficient maintenance.
- Lack of flexibility.

Large corporations with extensive remote communications needs are finding long-haul private networks a cost-effective alternative to the available common carrier services.

Two-thirds of the network operators said the prospect of generating significant cost savings was the most important factor in their decision



What can't be ready for the brilliance of technology, we'll be there.

Kaplan is a senior market analyst for the communications industry research program at International Data Corp. in Framingham, Mass.

Special Report

but users must analyze costs, benefits before buying

to develop a private network. The added control and security that a private network provides was given as the second most important factor. Increased speed and service was less important to the respondents.

Resale capacity pros, cons

Only one of the respondents indicated that his private network was built to take advantage of its resale capacity.

IDC has consulted with a number of firms considering the resale capabilities of their private network facilities. These companies have applied for private microwave licenses with excess transmission capabilities to avoid having to reapply to the FCC in the future to meet their expanded needs. They have acquired overseas transmission systems with additional traffic capacity in hopes of generating added revenue by reselling long-distance services to other users to pay back their investment.

This type of venture should be avoided in cases where the private network operator lacks the organizational capability to manage a resale operation. We have also found that few companies are willing to entrust their communications requirements to an inexperienced and untested service provider like a private network operator. Therefore, the realistic revenue-generating potential of these systems from resale operations is minimal and unlikely to justify the costs.

Many large-volume users, however, are installing their own private networks with considerable excess capacity. The prospect of many of these private network operators finding themselves unable to manage their systems profitably has attracted the attention of a number of telephone service resellers.

Shrewd resale vendors have seen their position in the long-distance services market threatened by intense price competition and are targeting the private network operators as good prospects for their marketing skills. The resellers are offering to market the private network operators' excess capacity by redistributing it locally through a variety of techniques, including digital termination systems (DTS).

DTS are microwave-based, and, until recently, were regulated and licensed by the FCC. DTS offer users the high-speed, short-haul transmission capabilities they need to connect to a long-haul system. DTS are still not widely available because of past regulatory requirements and the financial cost of construction. However, IDC ex-

perts DTS to become an important link in the local distribution of long-haul services and a common method of reselling private network facilities.

If all or most of the new common carrier systems are constructed, a glut of transmission facilities will drive down long-haul rates significantly. The availability of

cut-rate services may lessen the financial need to resort to a private network alternative. Communications users considering a private network should evaluate their future costs in light of these changes in market prices.

The emergence of shared tenant services (STS) represents an important alternative to a private network op-

erated exclusively by a single user. An STS arrangement allows a number of users to take advantage of a transmission system furnished by a facilities manager.

IDC research, combined with similar findings from other user surveys conducted by the FCC and others, clearly showed a trend toward greater private network uti-

lization over the next five to 10 years. Large-volume communications users can benefit from the added control and flexibility that private networks provide.

But flexibility has its price. Users should be careful not to overestimate the capabilities of these systems and ignore other more cost-effective alternatives.



Alison Chappell. Photo of Reader 258. Courtesy The Business Journal.

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ROLM

Special Report

Decision-making forum can alleviate apprehension

By Leonard B. Gutstein
Special to CWC

Local-area networks have been touted as the next step in the evolution of the micro-computer. But the micro user community in business has shown a reluctance to take that step.

Just what has gone wrong?

The overriding issue may

No one wants to make bad decisions, and prospective network purchasers worry about doing just that. So they take a wait-and-see posture, and they do nothing.

simply be complexity: Potential buyers feel overwhelmed by involved and foreign con-

cepts such as protocols, gateways, topologies, access methods, standards and ba-

sebands vs. broadband. Alternative technologies, such as private branch exchanges

and mini- and mainframe-based networks, add to the confusion.

No one wants to make bad decisions, and prospective network purchasers worry about doing just that. So they take a wait-and-see posture — essentially an abdication of managerial decision making — and they do nothing.

To escape from this stalemate, DP professionals and potential users need to begin to grapple with networking concepts so they can plan for the eventual networking of corporate micros. They can do this by asking a series of questions that promotes a forum for decision making.

The following questions, which are grouped according to their relevance to one of four broad concerns, can help provide a structured review of various network offerings:

Printing

■ Is it necessary to have a dedicated print server? If not, can a user access printers at other workstations on the network?

■ Is there multiplexed printing capability?

■ How many printers may be attached to one server?

■ Is there print spooling?

As a firm answers these questions, it should keep in mind that one important reason for having a local-area network is making peripherals serviceable to several users.

Additionally, a good network should permit simultaneous multiplexed printing to several printers and should provide print spooling so that microcomputers can off-load I/O tasks.

Data base and file sharing

■ Can an existing micro be used as a file server, or is a proprietary file server necessary?

■ If a proprietary file server is unnecessary, then is it possible to use a hard disk as a nondedicated server for local processing?

■ What types and up to what sizes of hard disks does the network support?

■ Is there read, read/write and shared-access capability for data volumes?

■ Is there a network-level data base with concurrency? In that event, what security levels are provided? Is it possible to use locks on the field, record, file and volume levels?

The answers to the above questions should enable a firm to determine how well a

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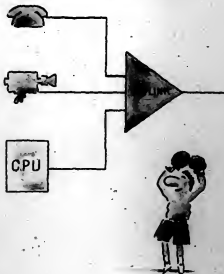
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Cartoon by vice-president and manager of computer resources for corporate finance at Smith Barney, Harris Upham & Co., a New York investment firm.

Special Report

about installing local-area nets in corporate arena

net can provide a consolidated data base that serves a large user community.

The network should allow for concurrent access to files and should have appropriate lock-out facilities. These ensure that simultaneous update does not corrupt data.

Communications

■ How are external communications accomplished? Is it necessary to have a dedicated controller for communications, or can one micro use another's modem?

■ Can modem connection and selection be made transparent?

■ Can the network communicate with mainframes? Must a separate protocol converter be purchased?

■ Can micros in remote locations dial in on the network and be serviced?

A firm's answers to these questions should indicate whether a given network will allow micro users to talk with each other through electronic mail, to dial out to time-sharing services and to establish high-speed bi-synchronous communications with in-house mainframes.

Potential buyers should insist on a 3270/Synchronous Data Link Control connection to IBM's Systems Network Architecture and an X.25 link to external communications.

Maintenance, administration

■ Can a microcomputer have access to any peripheral on the network, or must specific printers, disk volumes and modems be explicitly assigned?

■ If assignment is necessary, how easy is it to reassign?

■ How is volume status (read, read/write and shared-access) changed?

■ Can the network administrator remove people who are logged on to the local-area network?

■ If one node goes down, does this affect the others?

■ Are there network- and volume-level passwords? What other security features apply?

Answers to these questions should show a firm how well its in-house DP staff can handle the day-to-day operations of a given local-area network.

Prospective buyers should insist that vendors provide explicit statistics on mean time between failures. With respect to network security, prospective buyers should keep one maxim in mind — more is better.

Another consideration a net customer must make is that of cost. When a firm calculates the overall price of a local-area network, it should include the cost of each of

99

Moving toward local-area networking is a process of planning and problem solving; it is not especially improved by delay.

the following:

- Interface cards.
- Print servers.

■ Communications serv-

- File servers.

■ Network software.

- Hard disk systems.
- Protocol converters.

■ Wiring.

■ Installation.

■ Personnel.

■ Ongoing support and maintenance.

Finally, the firm that wants to move toward local-area networking should remember this: The process is one of planning and problem solving; it is not especially improved by delay.



A Data. Packed History Enduring the Speed of the Speed of Concord. Courtesy: The Concord System.

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Special Report

Custom wiring scheme grants engineering firm the

OAKLAND, Calif. — A custom wiring scheme has allowed a design and construction firm here to meet the data processing requirements of a work force that is in constant flux.

Raymond Kaiser Engineers, Inc. (RKE) moves up to 200 temporary design workers in and out of work spaces throughout its 25-story headquarters building during different stages of work for various construction contracts. A network of twisted-pair wire lets the firm hook up and interconnect, in hours, whatever equipment these workers require.

RKE proceeds in stages through its design and project management jobs — which have included work on the Washington, D.C., Los Angeles and

Boston subway systems and the National Aeronautics and Space Administration space shuttle launch facility — bringing on and laying off workers as needed.

For typical projects it sets up groups of about 30 permanent employees to make bids and arrange schedules, then brings in the temporary workers to do design and procurement tasks, according to Herman Cordes, RKE's MIS manager. "They come in literally off the street and start working," he said. They leave as soon as their work is finished, and the original 30 employees continue to supervise the project and work with the client.

As the work force on a project grows and shrinks, the project group moves to different work areas that can accommodate its numbers. "We move people around quite a bit," Cordes said.

The firm's headquarters, which opened for business last year, was designed to facilitate the flux. Each floor has a layout almost identical to that of all the others. The wiring system works on the same principle.

It provides jacks and adapters that allow most data processing and phone equipment to send and receive signals over a network of twisted-pair wires. The system accepts sig-

nals from the firm's Northern Telecom, Inc. 8L-1 phone system and its Datapoint Corp. Arnet minicomputer-based distributed processing system. It also connects RKE's 80 Lee Data Corp. All-in-One terminals and 30 Lee Data Personal Workstations to its 16M-byte IBM 4381 mainframe and links equipment on the Arnet with the 4381.

All the equipment is adapted to plug into an RJ41 jack, which resembles a common phone jack but contains additional wire, and each work area in the building is equipped with an RJ41. The jack hooks wires from the equipment into flat, under-carpet cables that carry signals from the equipment to their designated desti-



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Special Report

flexibility to meet DP needs of dynamic work force

nations. Each under-carpet cable carries six pairs of twisted-pair wires. Once a piece of equipment is hooked into the network, a wiring expert can establish circuit connection for it by switching on a specified number of the wire pairs. Standard phones and Lee 50ta terminals require one pair of wires to carry their signals; electronic phones and the Datapoint equipment require three pairs.

Whenever the firm wanted to hook up equipment in its old headquarters, it had to hire wiring experts to pull and retrack wires. The rewiring took about three weeks and cost about \$300 per terminal. Sometimes, especially for short-term projects, RKE had to scatter members of proj-

ect groups to different areas rather than spend the time and money to set up a central work space. "If it takes you three weeks to get something wired up," Cordes explained, "you're already a third of the way through your contract."

Now, each circuit connection reconfiguration requires only a few minutes, and employees from the firm's in-house telephone department can hook up an entire work area on demand in less than one day. Sometimes, problems with faulty wires force the firm to rewire connections. But RKE has always been able to set up the connections it needs, Cordes said. "We haven't hit one yet that

hasn't worked eventually."

He said the twisted-pair network can transfer accurate signals between any equipment that communicates at speeds up to about 1.5M bit/sec. Because most terminals transfer data at about that speed, he said, "we feel that we can accommodate about 90% to 95% of those terminals' communications through our lines."

RKE has linked six Convergent Technologies, Inc. AWS 467 micros over the wire and expects to be able to connect IBM Personal Computers once IBM offers a multi-user operating system for the machines. IBM has run some tests with its equipment on RKE's wiring sys-

tem, and, Cordes said, "They did not anticipate any problem."

Overall, the wiring has more than met RKE's expectations, he said. "Our experience to date indicates that we have accommodated all our phone and data processing requirements with a single type of wire that will meet the physical requirements of our office and the working requirements of our people."

For tests that require line speeds above 1.5M bit/sec, such as some mainframe-to-mainframe connections RKE hopes to establish when it purchases additional machines for sophisticated computer-aided design and manufacturing, the firm is installing a broadband CATV network.

Modems give phone wires data net use

By Jerry Gallagher
Special to CW

With the availability of data-over-voice, two-wire local modems, most firms that have a telephone system in place can handle data networking.

These modems enable voice transmissions and full-duplex, high-speed data transmissions to travel simultaneously on one wire pair. As such, they allow data processing equipment and telephones to share in-house telephone lines. Every telephone station, then, becomes a potential prewired site for DP equipment.

Simultaneous voice and data communications are possible because voice signals do not occupy the entire available bandwidth on telephone lines. Voice signals use only the lower frequencies, and data-over-voice modems use the higher frequencies to transmit data above the voice spectrum.

A system of frequency filters maintains the integrity of the separate voice and data channels (see Figure 1).

The modems work in pairs — a remote unit and a central one. When a digital data signal enters a data-over-voice modem, the unit generates an analog carrier frequency that it modulates with the data pattern. It then transmits the carrier frequency to another modem, which demodulates it and returns a digital signal to the computer system.

For full-duplex operation, remote units generate a different carrier frequency than central units.

Most remote modems use standard RJ-11C telephone jacks to interface

with the telephone system. They connect to data processing equipment via RS-232C/CCITT V.24 interfaces. In a typical installation, remote data-over-voice modems reside at work sites equipped with DP equipment, and central units reside in a computer room.

Central modems use telephone company-tariffed RJ-71C interfaces to connect to the telephone system on its main distribution frame. The RJ-71C interface, which supports up to 12 data-over-voice modem connections, usually resides in the computer room.

A typical data-over-voice modem application involves terminal-to-mainframe links. The modems can, however, provide micro-to-mainframe, micro-to-micro and word processor-to-printer connections. They work both in private branch exchanges (PBX) and, with some restrictions, in Central telephone systems. Although the no-point links, they also interface with tools such as T1 multiplexers, X.25 network packet assemblers/disassemblers and microwave links.

Users can communicate with resources accessible through the communications devices just as though their DP equipment was directly attached to these tools or to the resources themselves.

Data-over-voice modems can also be used with data networking devices such as PBX and switching mul-

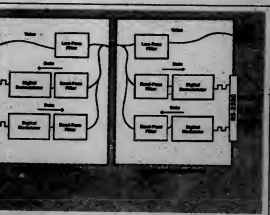


Figure 1. Remote and central data-over-voice units generate different carrier frequencies for full-duplex operation. The band-pass filters keep the two data channels separate and prevent voice signals from entering the data system. The low-pass filters prevent data from entering the voice system.

tiplexers that tie computer systems together and allow for switching among attached resources. Users gain access to a wide array of resources.

With the modems and a PBX, in fact, a telephone system can form the basis of a comprehensive local-data network.

Anything interfaced to the PBX is accessible over a modem-equipped link, and all of a computer system's resources lie as close as the nearest telephone wall jack.

Systems managers and users benefit from the capabilities of the PBX — all available over telephone lines to DP equipment fitted with data-over-voice modems.

In some cases, the modems can be used with a PBX as an alternative to integrated voice/data systems, which tend to be expensive.

The cost of the data option on an integrated PBX, for example, often runs close to \$1,000 per channel; the cost per connection in a data-over-

voice system/PBX network is significantly less.

When its voice and data systems are separate, a firm does not have to worry about how alterations made in one system will affect the other. Reconfigurations become less complicated, and each system can readily incorporate new technology. This is important because voice and data technologies evolve at different rates and often in very different directions.

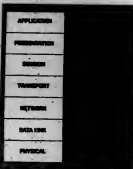
Data-over-voice modems are also appealing because they help to maximize the use of existing facilities.

In addition to making use of installed wiring, they extend the useful lives of many telephone systems. Users can, for example, have data on their telephone lines without replacing a voice-only PBX that is providing satisfactory service. This can ensure that a recently purchased PBX becomes fully depreciated or achieves payback.

Gallagher is national manager of Tivco Accounts for Gandy Data, Inc., a vendor whose products include data-over-voice modems.

Special Report

OSI reference model lays groundwork for



The Open Systems Interconnect reference model defines a layered architecture, consisting of seven layers.

By John Neumann
Special to CWS

Unprecedented in the history of computer-related standardization was the close collaboration between the International Standards Organization (ISO) and the Consultative Committee on International Telephone and Telegraph (CCITT) that resulted in the adoption of identical standards for both organizations.

A worldwide consensus concerning the Open Systems Interconnect (OSI) reference model and its related layer services and protocols has been achieved. International Standard 7498, is now recognized as the formal industrywide guideline for the construction of protocols designed to

provide full interconnection of heterogeneous systems.

The OSI model does not specify how systems are to be implemented — merely how they are to communicate. Different manufacturers will implement these standards in different ways in order to achieve product identity to gain market share. As long as the rules, or protocols, are followed, it will be possible for different implementations to communicate effectively with one another (see Figure 1 page SR/23).

For the user, this means unlimited configurations can be created when mapping the OSI model onto an actual system or in designing a new system.

The OSI model defines a layered architecture consisting of the following seven layers:

■ **The application layer** directly serves the end user by providing the distributed information service to support the application and manage communications.

Protocols being defined at this layer include virtual terminal, file transfer and file transfer.

■ **The session layer** allows the application to interpret the meaning of the information exchanged. Information is translated and formatted at this layer.

■ **The network layer** manages the dialing between the cooperating applications by providing the services needed to establish the communication, synchronize and resynchronize data flow and terminate the connection orderly.

■ **The transport layer** provides end-to-end control and information interchange with the level of reliability requested by the user. The transport layer chooses a protocol class that considers the user requirements and knowledge of the underlying network service.

■ **The network layer** provides the means to establish, maintain and terminate the switched connections between end systems. Included are addressing and routing functions.

The 1984 CCITT Recommendation X.25 Packet Level meets the service requirements of the network layer. Additional on-going work seeks to define a connectionless, transaction-oriented network service and protocol.

■ **The data link layer** provides the synchronization and error control for the information transmitted over the physical link. An example of a protocol at this layer is High-Level Data Link Control or Synchronous Data Link Control.

■ **The physical layer** provides the electrical, mechanical, functional and procedural characteristics required to activate, maintain and deactivate the physical connection.

Each of these OSI layers contains a logical grouping of functions that provides specific services to ease communication between users. Additionally, each layer logically lies over all the interconnected systems that are in a cooperating relationship.

At each interconnected system there are devices that interact via the peer protocol to ease communication.

In a typical interconnection between end systems where the application processes reside, there may be intermediate systems that serve as relay points, such as a switching exchange in a packet network.

Users introduced to OSI concepts often question the practical implications of this new architecture or question if they should consider the model in future equipment procurements. They wonder if the vendors will follow the model. They also ask when vendors will begin offering

Neumann is a senior consultant for network architecture at Unisys Corp. and chairman of the American National Standards Institute's technical committee, responsible for the Open Systems Interconnect model's transport and session layers.

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Special Report

uniform networking links

OSI-compatible networking and if local-area networks are compatible with OSI.

A quick scan of the membership lists of the various committees developing the protocol standards within the reference model should dispel some of these fears. The committee memberships read like a "who's who" of the computer industry: IBM, Digital Equipment Corp., Data General Corp., Hewlett-Packard Co., Honeywell, Inc., Burroughs Corp., Sperry Corp., Control Data Corp., Gould, Inc., NCR Corp., and M/A-Com, Inc.

Many government agencies are also active, such as the National Bureau of Standards and the U.S. Department of Defense. Users are not without representation either, as such companies as General Motors Corp. and Boeing Co. also participate in the standards groups.

Several industry giants including Honeywell and DEC have announced that their product offerings in communications and networks in the future will support OSI protocols. Users have the most to gain by stressing the importance of this new architecture in future procurements. It will

"

The European community is strongly behind OSI, and multinational vendors will have to support OSI protocols to remain competitive.

provide the freedom of choice in computing equipment not currently enjoyed by the user community.

Vendor offerings containing mature OSI protocol standards should begin appearing by late this year. As the protocols mature at the upper layers of the model, more vendors will migrate to this architecture.

Local-area networks are based on the OSI architecture. The IEEE-sponsored 802 Committee has produced a series of standards positioned at the lower two layers of the model. These standards have gained wide acceptance, and all public offerings are now based on them.

Even the widely touted Xerox Corp. Ethernet will be compatible with 802 Committee standards in its next release. The work of the 802 Committee is now being processed as international standards by ISO and the CCITT.

Default industry standards promulgated by one or more vendors for data communications is a thing of the past. While these proprietary offerings will continue to persist, look for a means to connect through gateways to OSI from these vendors in the near future.

The European community is strongly behind the OSI banner, and multinational vendors will have to provide for support of OSI protocols to remain competitive in Europe.

Work within OSI is not complete. While standards are in place for the lower five layers of the reference model, much work is still required in

the upper two layers and in the management aspects of the architecture. Given the scope of this work, true interconnection will probably not be possible until the end of this decade.

In the meantime, more products will support the completed OSI protocols. Such products should be able to add increasing functional capability as the standards mature. More work is ongoing within the architecture to define directory services, security, addressing and the connections, transaction-oriented facilities needed to complete the picture.

Quite simply, OSI is here to stay. It is solid, accepted by the industry and long overdue in the eyes of the user community.

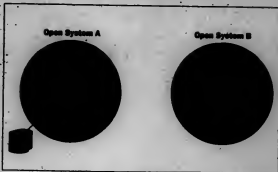


Figure 1. The OSI reference model does not specify how systems are to be implemented, merely how they are to communicate.

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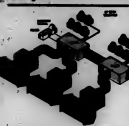
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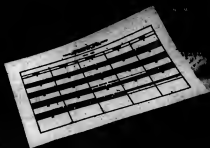
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Special Report

Satellite links clear path to reliable data transmission

By Thomas H. LaBelle
Special to CWS

While satellite communications links are not needed by all corporations, they are a communications option. In some instances, they are the only options a facility may have for reliable, efficient and secure data transmission.

For this reason, network

managers should know the reasons to include satellite links in a data network. Satellite links are especially useful in the following ways:

■ **Hard-to-reach areas.** If a facility is located in an isolated area where high-speed data transmissions are impossible through the local telephone company, satellite links are viable options.

They are the only options in areas where there are no local telephone companies.

■ **Extreme reliability.** Satellites are impervious to sewer company ditch-witches, drunk drivers who knock down utility poles and the countless problems that can and do crop up every day in the central offices, wire centers and toll offices that

handle terrestrial lines. A satellite has only two problems: Twice each year it gets in the line of sight between the ground stations and the sun. This causes the solar effluence to overwhelm the satellite's signal.

■ **Long distances.** In a terrestrial circuit going from San Diego to Boston, there may be hundreds of repeat-

ers that have to be paid for, but there is only one with a satellite. The tariffs of many satellite vendors reflect this pleasant fact of life — especially for more than the standard 3-KHz VP bandwidth is needed.

■ **Bandwidth.** Rates of 56K bit/sec and up can be quite economical on satellites. The satellite carriers originally went into the business with the idea of selling raw bandwidth. This meant video, T1 and Telepak.

■ **Security.** For many, this is the most important reason to use satellites; especially in conjunction with a corporate rooftop earth station. Why? First, no one can eavesdrop on company transmissions. Anyone can point a dish at the satellite, but how is he going to know which of the thousands of channels he picks up belongs to you?

Remember, a satellite beams all of its down-link transmissions over every square inch of the country, and those transmissions contain the traffic of every subscriber using that satellite — a communications satellite is, after all, nothing but a broadcast radio. About the only way someone could eavesdrop on a company's transmissions is by finding out from the carrier which channels on which transponders the company owned.

A negative side

There is a negative side to satellite communications, however. While those who have used them to talk appreciate their fidelity, turnaround delay is quite disconcerting because it results in clipped speech and echo problems.

The chief problem with satellites is that they are so far away (22,300 miles) that even at the speed of light (186,000 mile/sec), a signal takes almost 0.25 sec to get from point A up to the satellite then down to point B.

Voice conversation can be rather awkward with almost 0.5 sec of dead time (propagation delay, as the physicists call it) between the end of one sentence and the start of the reply. It is because of this delay that people cannot (or will not) use satellite circuits to transmit certain types of data.

The explanation for this follows. If you have ever watched the monitor of a computer on a data hookup, you know that not all of the on-line time is spent sending data from source to sink. In-

See LW88 09/28

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LaBelle is a senior associate with LaBelle & LaBelle, a data processing and telecommunications consulting group based in Seattle.

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Special Report

Network trims circuit costs, solves transmission problems

DOE contractor's multiplexed network links 150 terminals to mainframe, minicomputers

LAS VEGAS — Scientists who wanted to exchange data among host mainframes at a firm here that performs R&D work for the U.S. Department of Energy (DOE) once relied on a setup they called Footnet.

Footnet worked this way: A scientist would capture data from one machine on tape or disk, then take the tape or disk, "stick it under [his] arm and hoof it over to the next machine," according to Terry Johnson, head of the Network Operations Section in the Computer Systems Division of EG&G Energy Measurement, Inc. (EG&G/EM).

The firm's administrative staff members used dial-up telephone lines to transmit data between their offices and the DOE.

Transmission errors forced these employees to

send and resend data up to 15 times until it arrived intact.

Data volumes sometimes shut down voice communications to and from the firm, and dedicated lines cost about \$6,000 per month.

To cut costs and remedy transmission problems, EG&G/EM decided to install a multiplexed communications network. The firm wanted a network that could accurately transmit scientific and administrative data relating to its work.

As a prime contractor to the DOE, EG&G/EM gets paid by and does all its work for that department. It builds instruments that measure emissions from nuclear and solar energy sources, and its employees operate those instruments at DOE sites. The Lawrence Livermore, Los Alamos and Sandia National Laboratories rely on EG&G/EM locations.

EM's equipment and personnel.

The firm supports the department through seven locations in five states. Its 2,400 employees help with underground nuclear weapons tests at the DOE's Nevada Test Site, conduct serial remote-sensing surveys throughout the country for nuclear radiation and conduct research to improve the precision of nuclear and solar energy measurements.

EG&G/EM's management set four criteria for a communications network to support these efforts. The network had to do the following:

- Provide flexible communications paths to link computing systems supporting both administrative and scientific functions.
- Provide error-free data transmission from all EG&G/EM locations.

One of the services EG&G/EM provides to the DOE is the operation of aircraft equipped to measure hazardous materials in the environment. This helicopter checked for radiation at Three Mile Island during the accident there in March 1979.

- Lower data communications circuit costs.
- Eliminate primary data transmission over voice phone systems.

In June 1981, EG&G/EM bought a data communications network from Digital Communications Associates, Inc. (DCA). The network consisted of one System 365 master network processor and 16 Series/100 statistical multiplexers. Initially, it connected about 48 terminals — mostly Texas Instruments, Inc. 7530s and 820s and Lear-Siegler, Inc. ADM-11s — to a Control Data Corp. 6400 at the DOE.

EG&G/EM added terminals and hosts to the network until it connected about 150 terminals — the TI and Lear-Siegler machines plus Digital Equipment Corp. VT100s — to both the CDC mainframe and a number of DEC PDP-11 and VAX-11 minicomputers.

Settled objectives

The network satisfied the firm's communications objectives by decreasing the amount of time employees spent trying to communicate with the DOE mainframe. Employees could usually complete data transfers in one 15- to 20-minute session, whereas multiple attempts to communicate over the dial-up lines had sometimes con-

sumed 114 hours, according to Johnson.

"Performance improvement has been profound," he said. In addition, EG&G/EM's use of statistical multiplexers rather than dedicated voice lines has cut the firm's monthly circuit costs in half.

Since 1981, the network has expanded. It now links more than 700 terminals and more than 25 host computers — mainly DEC VAX-11/750s, linked through a Decnet — and includes 16 System 866 network processors.

More than 100 Decnet word processors are tied in to the network.

The network handles both synchronous and asynchronous communications through two-channel, bit-interleaved, time-division multiplexing. A multiplexing tool, DCA's Synchronous Channel Option (SCO), allows two independent data streams to share one line.

EG&G/EM uses one data stream for interactive applications and the other for distributed data processing, Johnson said. The firm maintains an SCO on approximately 10 of the 25 dedicated circuits it has in use.

EG&G/EM is working on documentation efforts that fall behind as the network expanded, Johnson said.

LINKS from SR/26

...deed, a goodly portion of the time is spent on the house-keeping function of acknowledgment. Like the human who asks, "Did you get that, did you understand me?" after talking for awhile, the computer, after sending a block of data, asks the device on the other end to return an acknowledgment (ACK) — data received OK — or a negative acknowledgment (NAK) — data not OK, please send the block again.

Because these ACKs and NAKs are not data, they make for unusable but necessary line time; and the more there are of them and the longer they take, the less

data there is that can be moved down the line. All terrestrial data networks, be they leased lines or dial-ups, are formulated on a compromise between the following three variables:

- The number of probable error/hour at the desired line speed — the higher the speed (9.6K vs. 2.4K bit/sec) the more error/hour you get.
- Block length vs. retransmissions. Long block lengths require long retransmission times, but the cleaner the line, the longer the block you can get away with.
- The time consumed by the number of ACKs and NAKs you will encounter as a result of block length and the anticipated error rate.



Special Report

Software integral to data network management

Well-selected tools improve service, productivity, resource allocation

By Tim Tyler
Senior Writer

Arguments for centralized and decentralized data networks abound, and proponents of each have solid reasons for their beliefs, but one aspect of network management transcends the split in camps: Whether a firm centralizes or decentralizes, software can provide the key to network control.

Network management software allows organizations to pull together diverse resources in order to present a unified picture to their users. The results can include better service, more efficient use of personnel and improved resource allocation.

Features to look for in a network management software system include:

- The ability to manage the entire network as a single entity, regardless of the individual applications in use.
- The ability to control the network from a single terminal.

- The ability to divide the network into logical operating units.

- An error warning system that collects and analyzes error rates and trends.

- An interconnection between CPUs.

- A fourth-generation network control language.

- Automatic activity logging.

- A multiple application interface.

- Data transmission services.

Together, these features can give network managers both flexibility and control for their systems. Separately, they provide a number of benefits.

The ability to manage the entire network as a single entity allows for the use of one sign-on procedure, providing operators with the ability to access all network applications without having to sign on and off constantly. User identifications and security passwords should be in place to prevent unauthorized access.

The ability to control the network from a single terminal allows for the centralized routing of Viam messages, preventing them from getting lost in the system and divorcing them from the system console. The use of abbreviated Viam commands and program function keys simplifies Viam control.

The ability to divide the network into logical operating units allows network managers to partition the network so that operators only receive messages appropriate to the part of the network for which they are responsible. The setup also provides an additional level of security.

An error warning system provides network operators with information to resolve problems before these problems bring down the network. The warning system should integrate user-specific information and should provide a direct interface to System Network Architecture control units so that statistics can be incorporated into reports.

An interconnection between CPUs

allows the systems staff to connect multiple copies of network management software with each CPU so that one operator can control a multi-CPU, multi-site network.

A fourth-generation network control language provides the ability to automate many day-to-day network operations, to provide predefined command sequences that handle network failures, to permit the construction of standard operation command sequences and to allow for sophisticated tailoring of the system to users' requirements.

Automatic activity logging of all

events, commands and responses to disk or hard copy gives managers an overview of the network's functions. It should permit on-line hovering to give operators immediate access to log information. An interface to the network control language should be provided to allow for untended reaction to network events.

A multiple application interface allows any terminal to access IMS, CICS, TSO and other software simultaneously, thus reducing the need for additional hardware. This feature should also provide multiple sessions to the same application — from the

same terminal at the same time — thus improving programmer productivity.

Data transmission services, which provide the ability to transmit data files and data base information around the network, eliminate the need for air freight or mail services and allow for quick and efficient means for the transfer of information. This feature should also provide for the integration of data transfer operations with batch or on-line processing, allowing complete multi-site job streams to be built, initiated and executed automatically.

Local Data Protocol Converters



Datalynx/3274 connects 1 to 9 async CRTs and printers to a 3270 multipoint network, SNA or BSC.



Venatlynx/3278 allows an IBM 3178/3278 terminal to access ASCII systems using asynchronous protocols.



Interlynx/3287 attaches low cost serial ASCII printers to IBM Type "AC" cross ports on 3274/3276 controllers and 4331 CPUs.



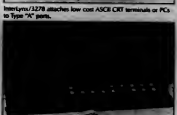
Datalynx/3291 connects 1 to 9 async CRTs and printers to a system/3 host.



Interlynx/3278 attaches low cost ASCII CRT terminals or PCs to Type "AC" ports.



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Tyler is a Dallas-based regional manager for Cincos Systems, Inc., a software vendor.

"Your Lynx to IBM"

Special Report

MIS cannot live by single-vendor net alone: Access in

By Susan M. Sutherland
and Michael S. Becker
Special to CWS

The role of MIS managers and network implementers is more complicated than ever. They are confronted on one side by myriad decisions concerning the use of personal computers, local-area networks, wide-area networks and integrated voice/data private branch exchanges and on the other by end users pushing for information access.

Once the acronyms and technologies are understood, the real problem, that of interconnecting all the equipment with the associated applications programs and data bases, begins. In many situations, network im-

plementers must find a means to interconnect equipment from a variety of vendors, often while continuing to incorporate new technologies into their networks.

Most large corporations have already set up complex networks to optimize their communications functions and provide additional features and applications to users. The most widely used network architecture is IBM's Systems Network Architecture (SNA), with an estimated installed base of more than 20,000 host processors.

Users, however, also have a large number of incompatible vendors' systems located at sites with IBM or IBM-compatible hosts. Research indi-

cates that more than 95% of both Digital Equipment Corp. and Control Data Corp. systems are installed at IBM-compatible sites, as are anywhere from 15% to 22% of systems from Burroughs Corp., Sperry Corp., NCR Corp. and Honeywell, Inc.

SNA predominance and host-to

Because of its popularity among users, SNA has become a de facto industry standard. Furthermore, the continual evolution of SNA shows that IBM has made a commitment to this architecture and is actively seeking to increase its rate of adoption by users.

Though SNA-compatible environments are becoming more popular,

implementing and maintaining an SNA network is costly and complicated. Additionally, a larger host processor or multiple processors may be required.

A result of SNA's evolution is that it no longer supports many older devices. For the user, this makes it necessary to purchase either expensive replacement equipment or some sort of conversion device.

Of even greater consequence is SNA's tendency to lock a user into a single-vendor situation. Vendors of non-IBM equipment have often suffered because of their products' uniqueness, while plug-compatible vendors have been pressured to keep pace with the changes that IBM has made to SNA.

Non-IBM-compatible vendors may offer better solutions for specific problems, but the user then faces the cost of maintaining multiple DP sites that are not interconnected in a network.

In the real world, few network implementers enjoy the simplicity of working in a single-vendor network situation. Their organizations have made a substantial financial commit-



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Figure 1. Access to SNA through protocol converter.

ment to hardware, software and service from many other vendors, including common carriers. For these implementers, interconnection with IBM networks has three key advantages:

- It provides the ability to share critical resources and information.
- It preserves established and reliable applications programs and associated data bases.
- It eliminates unnecessary barriers to the free flow of information.

Universal connectivity

From a user's perspective, the challenge is to provide economical access to any desired end point in a way

Sutherland and Becker are senior research analysts for NCR Canada, Inc., a developer and manufacturer of data communications systems based in St. Paul, Minn.

Special Report

and out of SNA provides universal link

that is transparent to the location or device architecture. Such communications ability would help eliminate the costly maintenance of separate data processing sites for different host types and would not entail hardware or software replacement costs.

The Open Systems Interconnect model being developed by the International Standards Organization may eliminate interconnection problems in the future. It addresses the need for a universal communications standard, a need recognized by most suppliers to the data communications user community. The objective of this model is to create a common environment through which all computers can interconnect.

This solution, however, will not be available soon. All seven layers of the model must first be defined and established as a standard. Only then can products be developed and the long process of market acceptance begin.

Access into SNA

Because of the size of users' investment in established non-IBM processing sites, some alternatives are available to network implementers to make noncompatible pieces appear compatible. To date, most of these methods are directed at giving non-IBM users access to an SNA network. This can be understood by briefly looking at the two major methods of connecting non-IBM-compatible devices to IBM hosts.

The first approach allows a terminal or group of terminals to access an SNA host through protocol conversion. These so-called black boxes, which can be free-standing or integrated, and software packages allow network and points to appear compatible with each other (Figure 1). This approach makes sense for users having a large installed base of non-SNA-compatible terminals that would be expensive to replace.

Protocol conversion allows users to preserve their investment in existing equipment and applications without losing networking functions. This approach may also make sense for small users because it gives them the option of purchasing less expensive, non-SNA terminals.

Another approach, used primarily by minicomputer vendors, is emulation of IBM 3270 terminals. This method provides a gateway into an SNA host by making a non-IBM processor look like a PU2 cluster controller. This allows terminals attached to the minicomputer to access applications both in the minicomputer and in the SNA host.

Similarly, most mainframe vendors understand the necessity of co-existing with IBM. Therefore, they have developed interconnect devices to let their non-SNA equipment access IBM-compatible host applications.

Access out of SNA

The limitation of these approaches is that they allow network interconnect only in one direction. In other words, although they allow non-IBM equipment to access SNA hosts, they do not provide for communications flow from devices out of an SNA network to non-IBM hosts.

This escape out of SNA is a networking necessity for many net-

work implementers. It allows their devices in an SNA network to access other hosts by CDC, DEC, Honeywell and other vendors. That access lets users preserve the considerable time and expense they have already invested in established, non-SNA applications programs. Without this access, the users' alternative is a costly and time-consuming migration of their established applications onto an SNA host.

One method of providing access from SNA to established, non-IBM applications is through a communications processor (Figure 2).

In the multivendor environment, the benefits of this approach are many. That capability lets network

implementers link their expanding group of departmental personal computer users with either SNA or non-SNA hosts. As a result, users can preserve their specialized non-IBM applications programs while still incorporating SNA. The access out of SNA also lets network implementers fully interconnect the established non-IBM networks they may inherit due to acquisition or network consolidation.

Most importantly, however, options like protocol conversion and access out of SNA let users select their network hardware, software and vendor, based on the merits of their features and benefits, not their market dominance.



Figure 2. Access out of SNA to established non-IBM application.

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Special Report

Aligned with future organizational needs, wide-area

By Jerry Boudreau
Special to CWS

A wide-area network is an intercity communications vehicle for transmission of voice, data and image of managed facilities. Today, most telecommunications managers are looking closely at the benefits, cost and various means of implementing or integrating wide-area networks for their organizations.

If you are thinking about implementing or integrating a wide-area network, ask yourself, "Can it support my future needs—those I anticipate and those I cannot foresee?" Your answer is especially important because a wide-area network is the only network that affects all divi-

sions and regions of a corporate or state organization.

Since the divestiture of AT&T, many managers have recognized the need for comprehensive wide-area network planning. Most expect to begin implementing or integrating such a network in 1985 or '86. Yet, they expect a wide-area network to serve their network needs well into the 1990s. At first glance, this long-planned horizon may seem unrealistic in today's rapidly changing telecommunications industry. However, it is really a logical expectation considering the wide-area network's importance.

A wide-area network affects the entire organization whereas the im-

pact of a private branch exchange (PBX) or local-area network is usually restricted to a division or region. Therefore, making wide-area networks future-proof can be defined as the ability to support organizational requirements for at least the next decade.

Managers considering a wide-area network should first address these three general areas:

- Service.
- Compatibility and control.
- Environment.

Services

The demand for wide-area networks will grow dramatically as enhanced services such as data support and videoconferencing are added.

Managers can meet the complex requirements of data, transport and management with both circuit and packet switching on the wide-area network, which must support the dedicated data end user with seamless access and the dial-up data end user who accesses many different locations.

Capabilities of an old network such as an Enhanced Private Switched Communications Service vs. the future wide-area network can be compared (see Figure 1).

The capability of providing these enhanced services has come from the following two sources:

• The conversion of telephone switches from analog to digital technology.

• The availability of customer-premises, high-bandwidth transmission. For example, T1 has 24 64K bit/sec digital channels that can be combined or compressed based on the user's need.

In the future, more high-speed, high-quality services will become available. Sub-T1—six 64K bit/sec digital channels—will allow digital, end-to-end connections for most locations, regardless of size. Sometimes that will involve several hundred locations. The wide-area network must permit efficient and responsive management for all locations accessing the network.

Compatibility and control

The wide-area network has a unique demand placed on it for future capabilities. It must be capable of interfacing with many different PBXs, hosts and terminals on the user side and with the many high-quality, emerging transmission alternatives on the carrier side.

To offer effective, long-haul facilities, the carriers will employ satellite, fiber-optic, microwave and other technologies. And several of these carriers' transmission media actually are as high quality as AT&T's.

The requirements for both user and carrier will meet at the wide-area network. To make this collision of choices future-proof, the manager must simultaneously provide compatibility and control. Therefore, the wide-area network must have an on-premises, network management control that can accomplish the following:

• Monitor and control the flow of data on the network.

• Monitor and perform sophisticated routing.

• Isolate hardware problems from transmission failures.

• Provide simulations to the customer so that changes in the location's traffic can be tested before expensive commitments are made.

All of these tasks must be done transparently to the end user, who is talking to Los Angeles from New York while accessing a computer that is in Atlanta. Multiply this one user by 50,000 other users, and expand three locations to several hundred, and the importance of centralized, customer-premises control of the

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Boudreau is vice-president of marketing and planning for Honeywell, Inc.'s Communications Networks Division in Dallas.

Special Report

networks extend corporate, intercity communications

wide-area network is evident.

Prior to divestiture, the issue of future line costs was quite simple. The manager could estimate his future long-haul costs from AT&T with one certainty — they would go up significantly.

Video units

A quick, baseline chart added to projections of his organization's growth yielded the voice costs. A count of leased Dataphone Digital Service (DDS) circuits for data with even higher growth projections gave him data transmission costs. Pretty quick and pretty expensive. The future of line costs is a good news/bad news story.

The good news is that movement of data onto the voice network and intense carrier competition will allow the manager to hold or drop transmission costs for the next several years. Figure 2 shows cost motivation for eliminating DDS service by integrating this data traffic onto the wide-area network.

The bad news is that integration of voice and data will not happen automatically — the wide-area network must be customer-managed like any important resource. Switching costs must be separated from transmission costs so that new carrier alternatives can be used. This

management effort is worthwhile because large organizations spend millions of dollars each year for voice and data transmission.

Committed to competition

Congress and the Federal Communications Commission are committed to a competitive environment for long-distance service. Historically, every industry that has gone through deregulation has eventually provided a superior product to the end user.

Future planning in an industry as dynamic as telecommunications is difficult at best. However, the wide-area network is so critical to an organization that attempts must be made to future-proof it. Digital technology

04

- Toll-quality voice (64K bit/sec)
- Low-speed analog data
- Separate leased-line digital data
- Only large locations on network

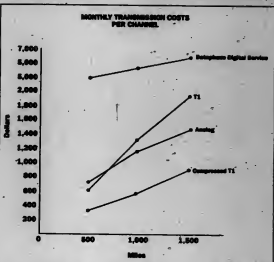
Further

- Compressed toll-quality voice (32K or 16K bit/sec)
- Bandwidth management of all data users:
 - Host-to-terminal
 - Host-to-host
 - Host-to-cluster controller
 - Terminal-to-terminal
- X.25 packet switching
- Majority of locations on network
- Centralized network status and control
- Video teleconferencing

A comparison of an old network vs. the future wide-area network

switch architecture and the wide availability of digital circuits from many carriers will provide in a private network the service level the marketplace requires to meet its future communications needs.

Future-proofing is not an end in itself. A manager makes a decision future-proof so he can start to implement that decision. Lost savings for transmission and reduced end-user productivity can never be recovered.



The cost motivations for the elimination of Dataphone Digital Service are apparent in cost/channel figures.

Options available for implementing wide-area nets

Once a decision has been made to implement a wide-area network, managers are faced with a myriad of implementation options. The possibilities fall into four broad categories:

- Tandem-based.
- Private branch exchange (PBX)-based.
- Common carrier-based.
- Virtual-based.

Tandem switches are useful for large organizations with many locations and sophisticated requirements for voice, data and image. Based on the organization's traffic patterns, tandem switches can be placed strategically to maximize savings on long-haul circuits by managing the different kinds of communications on digital trunks like T1.

Tandem switches interface with all PBXs and carrier services. Routing and networkwide management are integral to Tandem design, whereas these capabilities are add-on applications in PBXs.

• The newest generation of PBXs provides office automation with a switch that can support almost any office application from the user's station. The latest designs also support limited networking if the trunking is not excessive and if all the PBXs are from one vendor.

Implementing this type of wide-area network is the best solution for organizations that do not have a large amount of on-net traffic; such as voice and data from our company location to another, and that are comfortable in committing their switching future to one vendor.

Before selecting a vendor, a telecommunications manager should investigate the current networking features of a PBX. Typically, the PBX vendor presents a sales brochure — (40) by the PBX's strong point. Therefore, the manager should thoroughly investigate the other major features and the portability of the PBX. Most of

when heavy networking and data demands are placed on it.

A wide-area network changes from a private to a dedicated network when a common carrier is used because the telecommunications manager is not in control of his own network from end to end. He is entirely dependent on the carrier for routing and quality. Therefore, the manager should be satisfied with the quality of service, as well as the carrier's commitment to new services, before he selects a common carrier to implement a wide-area net.

The common carrier approach to a wide-area

Virtual wide-area networks will not have the effective management features and response capabilities of a private net until the early 1990s.

network bandwidth for smaller organizations that do not have their own servers for data or content storage. However, in order to get the required service level and benefits, an organization must have a minimum of 10 Mbps two connections.

The first thing was agreeing to use that particular casting device, just as you're doing.

meeting a wide-area net by using a common carrier is that any of the common carrier technologies may become less preferable in the future when new offerings based on fiber optics and other technologies become widely available.

Virtual networks, such as AT&T's proposed Software Defined Network (SDN), are based on the concept of adding intelligence to the public network switches so that a customer can request digital or analog connections as needed.

Reducing vs. maintaining costs

The driving force for virtual-based networks is the possibility of reducing long-haul transmission costs vs. maintaining the existing costs for dedicated private lines.

The inherent design of the virtual network is similar to the tandem-based wide-area network in other aspects. Callers and customer-channel signaling are used to define a particular custom-

If SEM can survive the regulatory issues, resolve the local access issues and meet the challenges from major carriers, it has great potential for becoming a widespread network. The major obstacles remain to be worked out, such as SEM management features and the competitive environment of a network network model.

Eventually, in an effort to attract the largest customers, nationwide, we'll use the ECH Camp, will offer a similar virtual net-

There are several approaches to

...on an eye-
and its strategic

Special Report

Ethernet system eases information flow at naval site

RIDGECREST, Calif. — At the site near here where the U.S. Navy designs and tests weapons such as the Sidewinder and Sparrow missiles, scientists and engineers exchange text, graphs and formulas over one of the largest Ethernet networks in existence.

The Naval Weapons Center (NWC), China Lake, Calif., depends on 11 Ethernets, linked together via networks and phone lines into a larger network, to help scientists, engineers and administrators abreast of each other's work.

Since its installation in 1981, "the system has become a vital part of the center's activity," according to Donnie Goettig, a program analyst who

'[The network] gives us the ability to transmit documents of any sort, whether they contain graphics, text, equations or formulas.'

— Donnie Goettig
Naval Weapons Center, China Lake

manages the network in NWC's Office of Computing Applications.

The China Lake center serves as the Navy's principal R&D, test and evaluation site for air warfare and missile systems. Since 1943, when the Navy fired its first 36-in. rocket here, the station has mushroomed both in size and in importance to the

nation's defense.

Today, NWC includes target ranges, test tracks and RAD facilities where hundreds of major weapons development programs take place. It employs more than 4,100 civilians — including about 1,600 scientists and engineers — in addition to some 1,000 Navy personnel. Equipment

from 65 vendors serves the staff's information processing needs.

The Ethernet network's primary user group is the center's Electronic Warfare department, which occupies seven sites within a 36-sq-mile area. Scientists in the department develop electronic countermeasures and means to overcome target sites that are heavily defended.

They use Xerox 8010 Star workstations to prepare technical papers, graphics, modeling projections and administrative reports on weapons systems. The network's electronic mail system, carries the documents to other workstations and to printers, file servers and facsimile devices.

According to Goettig, the network "gives us the ability to transmit documents of any sort, whether they contain graphics, text, equations or formulas — whether they are project status reports, procurement requests, travel orders, electronic mail — anything."

Because the communications system is not secured, the NWC keeps classified data off the network. Employees prepare classified documents on Xerox 850 word processors. The word processing machines have access to the network but are disconnected from it whenever they process such work.

Digital Equipment Corp. VT100 emulators allow Star workstations users to access data stored in 19 DEC VAX-11s and two large PDP-11s that the NWC maintains on a Decnet. One of the DEC machines, a VAX-11/780, serves as a front-end processor on the center's mainframe, an SM-400 Sperry Corp. 1100-83. Through this VAX, which runs software that allows it to appear to the mainframe as a Sperry UTS 400 asynchronous terminal, users of the Xerox workstations can access information on the Sperry machine.

The setup also allows terminals hard-wired to a processor on the Decnet to exchange information with the Star workstations and the Sperry mainframe. Terminals hard-wired to the Sperry, however, can only communicate with that machine.

Plans for additional links

A cluster of six IBM Personal Computers, each with a chip-based interface to the Ethernet setup, has been linked with the network as part of a Xerox beta test. Goettig said the connection has been performing well. The NWC plans to link additional micros to the network as interfaces become available.

Some workers at remote outposts in the 1,800-sq-mile China Lake facility lack communications with the central departments that use the Ethernet network. Lou Giegerich, associate division head of the Electronic Warfare department's systems sciences division, said these employees will depend on the center's "pickup truck network" — driving to other sites to fetch or deliver documents — until the NWC installs a comprehensive network that reaches them.

The center recently began installing a fiber-optic network to establish communications throughout the facility. The project will require 50 miles of trunking plus enough cable to wire about two dozen central buildings and should be completed within five years.

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Special Report

Network designers must fulfill specific requirements

By John Voaca
Special to C&E

Communications network design aims toward the general objectives of balancing costs with capabilities and providing reliable, error-free communications to users.

These general goals translate into the following series of specific design requirements:

- Reliability.
- Transparency.
- Economy.
- Convenience.
- Security.

Naturally, a network designer must consider other topics, such as the general lack of communications standards and the growing con-

functions. A network's automatic hardware control may determine that the end of the text has arrived because that text contains a bit pattern mistakenly recognized as an end-of-text character. To network operators and users alike, the result of such an occurrence is both unpredictable and undesirable.

Fortunately, the American

National Standards Institute has set aside certain bit patterns, such as Synchronous Data Link Control (SDLC), to be used exclusively for hardware control. Because these patterns are used exclusively for control characters, they seem to circumvent the transparency problem.

Unfortunately, some categories of user information

(facsimile and graphics, for example) generate data with unknown values, including a high probability of designated control characters. A common algorithm, called bit stuffing, helps solve this problem in networks that use SDLC or other bit-oriented link-control procedures.

A fixed bit pattern, generally referred to as a flag se-

quence, isolates text from control information. Transparency is achieved around a text field by placing a flag sequence of a zero bit followed by another zero bit (01111110, for example) at the beginning and end of each text block. All switching computers within the network search continuously for this sequence.

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Economic considerations are vital, but they will hamper improvements in data transmission speeds over the next decade.

cern about personal privacy that has arisen in response to widely shared data bases. But the five design requirements represent the designer's chief technical concerns.

Reliability. In a communications network, reliability refers to the ability to provide uninterrupted, error-free service. Providing such service depends on addressing the question: "To what extent should the network provide alternate transmission paths and backup equipment?"

The answer to this question generally requires both a statistical analysis of cost vs. equipment reliability and a queuing analysis with representative load conditions. The load analysis is a major factor in the design of communications networks that must redirect traffic automatically depending on dynamic load conditions.

Transparency. Transparency means that the network is completely impervious to the information transmitted to it and that network operation is invisible to users.

Most networks do not have complete transparency: Certain values or bit configurations cannot appear in the text of a message because they are used for control

OUR MODEMS WILL TELL YOU MORE ABOUT YOUR LINES THAN THE PHONE COMPANY.

Voaca is a free-lance writer and consultant on information management and computer security. He also serves as planning and design coordinator for the Federal Home Loan Bank in Topeka, Kan.



Special Report

to provide reliable, cost-effective communications

In byte- or character-oriented link-control procedures, text can contain control characters. A specific control character, which is known as a data link escape character, precedes all other control characters and provides data transparency.

Economy. To provide economy, a network must have a minimum overhead

and use its communications media efficiently. Networks should be designed to provide service that will accommodate the needs of the majority of users without degrading service to infrequent users.

The power of computers to which communications links are attached normally exceeds what is necessary to

saturate existing low-speed links. Overhead, then, is essentially a concern about loads on interconnecting links rather than loads within communications processors.

Link overhead refers to those messages, exclusive of text, that facilitate communications between computers. A certain amount of control

information must be attached to each message so the receiving computer can examine the message and determine what to do with it.

An efficient procedure for transmitting control information will minimize overhead without seriously affecting flexibility. Differing media and computer interface characteristics, how-

ever, lead to problems in the design of a scheme that minimizes overhead.

Economic considerations are vital, but they will seriously hamper significant wide-scale improvements in data transmission speeds over the next decade.

Users resist upgrading

This problem arises because the primary communications media in existence — the land line — was designed for voice communications at bandwidths less than those required for high-speed data transmissions.

Users are not willing to invest the money involved in the upgrade of an existing

99

Regardless of other advantages that a network may have, its reputation can quickly be damaged because of its user interface.

land-line network or the installation of a new medium capable of communicating high-speed data.

Convenience. In a communications network, convenience means simple user access. If users find communicating with a specific type of network troublesome, that network is placed at a competitive disadvantage to other types. Regardless of other advantages that a network may have, its reputation can quickly be damaged because of its user interface.

The physical interaction required of users must be simplified so that they can establish connectivity with minimum effort. Once users make connections, their physical interaction with the network should be near zero, except for unusual occurrences such as failures.

Security. Data transferred through a communications network should be protected from undesired disclosure.

Several state-of-the-art encryption techniques allow users to communicate using privacy keys. Network users should keep in mind, however, that there are no perfectly secure computer systems, regardless of the image a vendor may give them.

The network designer, then, must consider various design features that enhance security rather than seek a perfect solution. Some computers, of course, have better security features than others.

RACAL

Special Report

Price attracts manufacturer to electronic mail system

ELGIN, Ill. — A manufacturing firm here had no pressing interest in electronic mail software for its IBM mainframe until a piece of direct mail that described just such a product at just the right price arrived at its headquarters.

"It was kind of inexpensive," said Norman Winter, a systems programmer for Chi-

cago Rawhide Manufacturing Co. "We had a little extra money in our budget."

So after the firm looked into prices for other electronic mail systems and decided against them, it bought the advertised product. The electronic mail software, Wizard Mail from Wizard Computer Products, cost \$595.

Last March, Chicago Raw-

hide installed the software on its 16M-byte IBM 3083 mainframe and gave 50 users electronic mail capabilities.

In two months, the firm recovered its costs from reductions in long-distance phone bills.

Chicago Rawhide manufactures oil seals, gaskets and automotive parts. It registered \$100 million in sales

last year. When it started operating in 1879, the firm manufactured buggy whips — hence, the name.

The company uses electronic mail to send inventory counts among its seven plants and eight warehouses throughout the country, to let workers at the plants and warehouses exchange messages with employees at

headquarters here and to give employees at headquarters an option to calling each other on the phone.

Approximately 256 IBM 3179 terminals currently have access to electronic mail. Terminals in the plants and warehouses are connected to the IBM mainframe via a leased-line network that the firm maintains for data communications.

Winter, who manages the electronic mail service for Chicago Rawhide, said the biggest benefit the software provides is the ability to send a message to someone, regardless of whether or not the intended recipient is at his desk.

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"We had a little extra money in our budget."

— Norman Winter
Chicago Rawhide
Manufacturing Co.

When it accepts a message, the receiver's VDT displays a few words that indicate a message has arrived. If the recipient is logged on to the system but away from his desk, the notification remains on the screen until it is acknowledged. If the recipient is logged off, the notification appears as soon as he logs on again. "It's easier than making phone calls all the time," Winter said.

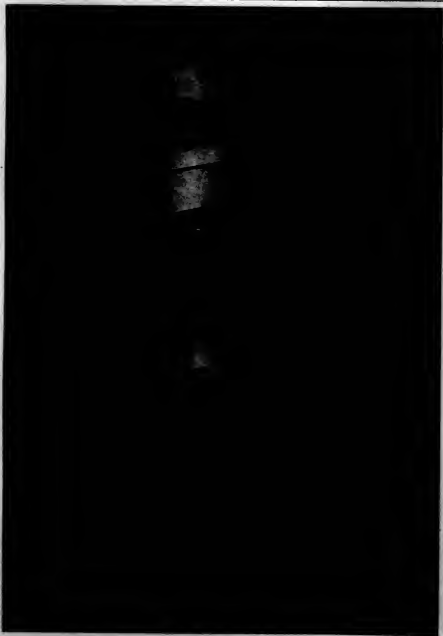
Recipients can retrieve their messages at any terminal, because the electronic mail is routed by name rather than by location.

Sending messages

To send a message, an employee first types a command that gives him access to an electronic mail screen. He then types the recipient's name and the message. When the user completes his message and strikes the Enter key on his keyboard, the message gets sent.

Winter has written a program so users can call up a list that shows all the possible destinations for their messages. Each destination is an abbreviation for the name of an employee who has access to electronic mail. To add new users to the system, Winter enters their names into a CROS file that sets up the electronic mail capabilities.

Each night, Chicago Rawhide prints hard copies of all the messages carried over the system, except those that are designated confidential. Each department receives its hard-copy messages the next day. Chicago Rawhide's employees send about 100 messages through Wizard Mail each day.



Special Report

Software gateways are micros' path to the processor

By Bruce Zimmerman
Special to CWS

Of all the communications schemes existing for personal computers, the software gateway to the mainframe environment for both the single personal computer and personal computer network is one of highest priority.

The software gateway to the mainframe environment for either a single personal computer or a personal computer network, must continue to be a management concern throughout 1985. Just as the single microcomputer will always have an application in the corporate environment, so will a variety of multiuser micros.

Their use within the corporate en-

vironment, however, is complex because neither AT&T's Unix-based systems nor local-area networks are consistently the correct networking choice for them.

For example, if a system is designed to support only three to five users, a multiuser system could be far less expensive than a local-area network. On the other hand, if a substantial personal computer investment is at stake and a communications scheme is required, a local-area network might be the correct choice.

A communications gateway, therefore, must be applicable across numerous configurations. But the challenge does not end there. Communications gateways also must exist in

environments where a standard networking architecture has not been defined.

The lack of a standard networking architecture has confused newcomers to the networking market. New technology is cumbersome; buzzwords such as "broadband," "baseband" and "token" are not important; and market presence is the major selling point. In this context, IBM has a clear advantage in effecting standardization. This is evidenced by the increased popularity of IBM's Systems Network Architecture (SNA), which is developing as the predominant networking architecture. SNA is IBM's approach to distributed processing and communications management. Unlike many networking schemes, SNA is mature, supporting numerous devices and able to operate on non-IBM hardware. In light of SNA's flexibility in different environments and current reputation as a mainframe network, it is logical that a software gateway support a solid SNA implementation.

In this context, the following rules of thumb are important in selecting

an SNA gateway for optimal performance:

1. Determine your system needs. Before a software gateway is selected, it is important to assess your system and communications requirements to determine how many devices need be supported by the system for communications and which hosts, host applications and operating system environments you want to access. Once this is done, an SNA gateway should be selected with full cluster controller emulation that is able to support multiple display stations and printers and access numerous

hosts, popular applications (CICS and TSO/SPF) and common operating systems (OS/VS, VM, DOS).

In addition to being able to configure a variety of control units, displays and printers to the SNA network, see IBM SNA/44.

Zimmerman is the director of marketing and sales at Pathway Design, Inc., a manufacturer of communications products in Woburn, Mass.

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Special Report

Standards key to continued network development

By John E. Sels
Special to CWT

In the complex communications marketplace, the existence of more than one local-area network standard is not only technically desirable but also commercially unavoidable.

Technically, one standard local-area network cannot be

expected to fill the needs for all local-area network applications. Commercially, the issue is driven partly by vendors that are unwilling to discard huge investments in networking simply because some industry groups are pushing in other directions for standardization.

However, the lack of a sin-

gle standard makes the potential local-area network user's choice a difficult one. An abundance of physical connection methodologies and high-level communications protocol sets — such as Xerox Corp.'s Xerox Network System (XNS), TCP/IP, Digital Equipment Corp. Decnet — exist.

Furthermore, the user may want to expand the network in the future, connecting today's assorted equipment. Without standard products, such expansion may not be possible, and the user may be locked out of future developments.

Managers considering a local-area network purchase should ask a number of questions, including how standard the product is, which local-area network approach best fits the particular applications and which products are currently available. Understanding the various local-area network approaches and the market forces behind them will clarify some of the issues surrounding these questions.

A local-area network technology — the method used to transmit packets between

network stations — is defined by four parameters:

- Media — twisted-pair, coaxial cable, fiber-optic cable.
- Signaling method — broadband, baseband.
- Topology — star, ring or bus.
- Access mechanism — carrier-sense multiple access

or received a powerful push in early 1984 when General Motors Corp. announced plans to promote its Manufacturing Automation Protocol (MAP) as a standard for factory automation. Products implementing this technology probably will not be on the market until 1986.

One sign of a standard's acceptance is the availability of semiconductor chips implementing it. Ethernet chips have been available since 1983. Token-ring chips are expected to be available in 1986. And token-bus chips are expected in 1986. As critical to a local-area network choice as the basic technology, however, is the network's higher level protocol set. While the two lowest layers (such as the local-area network technology) provide a means to move data

packets from one station to another, the next four layers provide the essential establishment, reliability and flow control necessary for devices to communicate effectively over the network.

The specific protocols used can determine, for example, whether local networks can be linked into long-haul networks; they also can affect network performance significantly.

Several protocol architectures have emerged as formal or de facto industry standards. Among the most firmly established is the XNS protocol set. XNS was developed by Xerox and placed in the public domain in 1981; XNS is the only commercially available protocol set specifically designed to work with local-area networks. One strength of XNS is its inter-networking capability (protocol Layer 3), which permits user-transparent networking between multiple Ethernets and from Ethernets to other network types.

XNS evolved from an earlier protocol set called TCP/IP, which was developed as a combined local- and wide-area solution by the U.S. Department of Defense's Advanced Research Projects Agency. An important force behind TCP/IP in recent years has been its incorporation into the AT&T Unix 4.2 BSD operating system kernel.

See NET SR/46

LOCAL-AREA NETWORK PROTOCOLS

System Name	Access Method	Media	Protocol Set
IBM Token Ring	CSMA/CD	Coaxial	IBM 802.3
IBM Token Bus	CSMA/CD	Coaxial	IBM 802.4
IBM Token Ring	CSMA/CD	Coaxial	IBM 802.5
IBM Token Ring	CSMA/CD	Coaxial	IBM 802.6
IBM Token Ring	CSMA/CD	Coaxial	IBM 802.7
IBM Token Ring	CSMA/CD	Coaxial	IBM 802.8
IBM Token Ring	CSMA/CD	Coaxial	IBM 802.9
IBM Token Ring	CSMA/CD	Coaxial	IBM 802.10
IBM Token Ring	CSMA/CD	Coaxial	IBM 802.11
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IBM Token Ring	CSMA/CD	Coaxial	IBM 802.100

The basic local-area network technology is defined at the physical cable and access-mechanism level (ISO 1-2). Higher level protocols are being adopted by various vendors and users.

with collision detection, (CSMA/CD) token-passing. High-level communications protocols are not included in this definition.

Three main local-area network technologies using various combinations of these parameters have emerged as market contenders. All three have been the subject of the Institute of Electrical and Electronic Engineers, Inc. (IEEE) standardization committees.

• The IEEE 802.3 standard, often referred to as Ethernet, is the best entrenched because it was the first of the three local-net technologies to be commercially available. Approximately 5,000 802.3-based systems are now installed, with an estimated 25,000 expected by 1990. Strong in data processing, office automation, engineering and scientific applications, the IEEE 802.3 uses a bus topology, its access mechanism and CSMA/CD. It has been implemented chiefly over baseband media, but also has been used on fiber-optic and broadband links.

• The IEEE 802.4, or token-ring technology, uses a token-passing access mechanism with baseband signaling over twisted-pair media. This technology is being driven largely by IBM, which in early 1984 announced a cabling system through which its own token-ring network will run when it becomes available in several years.

• The IEEE 802.5 is a token-bus scheme using primarily on broadband cable. Formerly a third runner behind the other two, this technol-

ogy received a powerful push in early 1984 when General Motors Corp. announced plans to promote its Manufacturing Automation Protocol (MAP) as a standard for factory automation. Products implementing this technology probably will not be on the market until 1986.

One sign of a standard's acceptance is the availability of semiconductor chips implementing it. Ethernet chips have been available since 1983. Token-ring chips are expected to be available in 1986. And token-bus chips are expected in 1986. As critical to a local-area network choice as the basic technology, however, is the network's higher level protocol set. While the two lowest layers (such as the local-area network technology) provide a means to move data

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Special Report

Office-linking mail system
revs up truck firm's savings

CINCINNATI — A trucking company rolled back its business costs by an estimated \$300,000 a year after it installed a communications network to link its field offices with its corporate headquarters here.

Intermodal Transportation Services, Inc., a firm that ships goods nationwide in its 500 trucks and arranges for piggyback shipments by train, installed its network two years ago. As part of a plan to streamline and control its business, Intermodal wanted to let employees at its 22 shipping terminals feed data to automated billing and tracking systems.

Although the firm had written extensive custom programs to run on a mainframe at its headquarters, it had no automatic means of capturing data generated in the field. "They didn't have anything out there but a pencil," said Chris Banks, Intermodal's MIS director.

At employees at the terminals coded billing data onto forms and sent the forms to Intermodal's headquarters, where keypunchers typed the information into a 6M-byte Burroughs Corp. Model 66690 mainframe that generated bills.

In June 1982, the firm bought an Apple Computer, Inc. Apple II personal computer for each field office and one Apple II for its headquarters. It linked the micro to each other and to the Burroughs mainframe via Western Union Telegraph Co.'s Easylink electronic mail service and some custom-written protocols.

Now, workers type customer and billing information on daily shipments into the Apple II's and send it to the Burroughs mainframe for processing. Custom software running on the mainframe adds appropriate rates for each shipping or receiving firm involved in the shipment. The software also apportions customer payments to various groups within Intermodal and to railroads that help transport the shipment.

Turnaround time

Within 24 hours the firm sends back to the terminals data that allows employees to code invoices and release the shipment. The 24-hour turnaround time is essential, Banks said, because the terminals cannot let a shipment go without first obtaining coded rate data from headquarters.

Before Intermodal started using the electronic mail service, it experimented with letting the terminals convey shipment data and receive rate codes over the phone. After it tried this system on some sample transactions, the firm estimated that if it used voice lines to convey information for all its billing transactions, it would spend \$800 on Wats and labor costs per day. Using electronic mail, the cost per day to transfer billing data is under \$100 dollars.

According to Banks, the communications system saves the firm an additional \$100 a day in Wats usage as the medium over which the terminals report their cargo loads to headquarters. In the past, the procedure required between four and five hours of Wats line time at \$20 per hour. Workers at the terminals phoned in information to an employee at headquarters who devoted his time to re-

ceiving calls and logging information.

Under the new system, workers at the terminals fill in on-screen worksheets that request information about cargoes and day-to-day operations. They send the information to the firm's headquarters via Easylink and an autodial modem. An electronic mailbox at headquarters receives the data, and employees there check the mailbox periodically for incoming data.

Intermodal also uses the electronic mail service in conjunction with custom-written reporting software to keep a lid on costs associated with

renting piggyback trailers. Railroads lease the trailers — containers specially constructed to fit on flatcars — on an escalating per diem basis. Daily rental rates rise according to how long the trailers are under

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lease. The daily rates can more than quadruple if lessors keep the trailers out too long.

Without a reporting system, Intermodal's terminals sometimes lost See SR48, SR/48

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Special Report

Atomic accelerator gets broadband boost

Five-mile coaxial cable network pumps life into The Machine

MENLO PARK, Calif. — A five-mile-long broadband cable network serves as a life-support system for the two-mile-long atomic particle accelerator that scientists at a laboratory here use to test theories of high-energy physics.

The accelerator — known simply as The Machine — consists of some 10,000 devices physicists use to generate and monitor speed-of-light collisions of electrons and positrons.

The network — an intelligent, bidirectional, midsplit cable system — supports the devices. "If that network goes down, the accelerator stops," according to Warren C. Struven, an electronics engineer at the Stanford Linear Accelerator Center (Slac).

Stanford University operates Slac for the U.S. Department of Energy.

Struven said the network, SLCNET, gets its intelligence mainly from Intel Corp. 8086 microprocessors that provide local control and monitoring

of the network. SLCNET represents advancements made by Slac engineers on basic technology brought forward by Sytek, Inc., Struven said. Technological features allow it to support voice, video and digital signals over coaxial cable

ets of the network:

- One Coherent translator supports four video channels. Slac uses to monitor devices involved with particle beam acceleration, a pilot channel that monitors the coaxial cable and 40 voice channels over which scientists along the acceleration chamber can talk back and forth with one another.

- The second Coherent translator supports six high-speed, point-to-point data transmission channels that carry information that tells the various devices along the particle beam's route how to operate.

- The Sytek translator supports one channel for software development, one for communications between the VAXs and various terminals connected to them and one that controls The Machine.

SLCNET supports more than 350 dissimilar devices, including pulsed radio frequency sources, vacuum systems, steering and focusing magnets and particle beam position monitoring equipment. "We're running the world on a 4-in. cable," Struven said.

Mobile control

Scientists can tap into that world from any one of 30 control points along the length of The Machine. Mobile control systems that Struven and his colleagues designed allow experimenters to move equipment among the different sites.

The mobile units carry a variety of devices — including terminals, digital displays and touch-panel equipment controllers — which plug into the cable network through Sytek hardware/software interface devices.

Most of the mobile control systems are carts that carry Ann Arbor Terminals, Inc. Ambassador terminals as their main component, but Slac uses some systems based on Tandy Corp. TRS-80 Model 100s that scientists carry from site to site in briefcases.

All mobile and permanent equipment links into the cable via CATV-compatible modems. Both the modems and the various devices undergo a series of tests before they are connected to the SLCNET. "Every component on the system must be very clean and transmit only the signals it's meant to," Struven said.

He explained that because the network uses time-division multiplexing, a bad signal from a single component can wreck a communications channel, and "one errant modem can knock the whole system down."

99

'We're running the world on a 4-in. cable.'

— Warren Struven

Stanford Linear Accelerator Center

for the various devices the physicists use in their experiments. Two Digital Equipment Corp. VAX-11/780s provide overall network monitoring.

similar to that used in CATV and to have the signals available for access from any point along the cable.

Two-way traffic

The network uses 4-in., 75-ohm coaxial cable with a 900-MHz bandwidth split into two frequency ranges — one for transmission, the other for reception. Frequency converters known as translators allow for the two-way traffic.

Translators take transmission signals coming in at one frequency and convert them into reception signals at another frequency. Slac uses three translators — one from Sytek and two from Coherent Systems, Inc. — to do the conversions for various fac-

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A small section of The Machine, a linear accelerator Stanford operates for the U.S. Department of Energy.

If the particle accelerator stops, it cools down, and components that guide particle beams go out of alignment. These components must then be redesigned to tolerances within millionths of an inch, a process that can take a full day.

The Machine is geared toward running 24 hours a day for months at a time, Struven said, and downtime costs between \$3,000 and \$4,000 per hour. Downtime also disappoints physicists from around the world who visit Stanford to perform experiments, Struven said.



The accelerator measures two miles from beginning to end (represented above by arrows).

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DATAPOINT

Special Report

PATH Part 2B/3B

work, the gateway should also support the configuring of printers as personal computer dedicated, host dedicated or shared to suit different applications. These capabilities will offer a great variety of selections for satisfying user requirements.

Another feature a solid controller emulator should possess is the ability to support up to 32 concurrent sessions in any combination of

printers or displays. Consider the communications speeds and error-detection mechanisms offered by the gateway. Speed and error detection are important communications requirements. A gateway that features a full SNA implementation will provide a 4,800 to 9,600 bit/sec synchronous connection to the host. In addition, a solid SNA gateway

The demand for a software gateway to the mainframe is increasing significantly in the corporate environment.

will not only monitor and detect problems with the actual communications line but also detect and recover from er-

rors in the message being transmitted.

Look at gateway transparency at the personal computer level. The ability for the local application to interface with the gateway is desirable for transparent access to host communications during local processing. Another example of transparency is the ability to interface with a custom application that re-

formats host data for direct inclusion in a local application. A gateway should be able to accommodate these requirements by providing routines for this interfacing.

Look for gateways for different configurations and training and support options from one supplier. It is likely that the environment requiring gateways will be composed of a combination of single- and multiuser systems. A single gateway supplier offering a product that supports all these configurations will reduce the learning curve for users working on various micro configurations. In addition, look for a supplier that provides comprehensive training and consistent support.

■ **Step 4: If the gateway can adapt to system expansions.** Is the multiuser environment, it is conceivable that you will want to expand to accommodate more users, different devices and so forth. It is important that the gateway matches your system's capacity to grow. This expansion might include multiple gateways on a local-area network to one or multiple hosts.

In both the Unix and local-area network environments, there are factors to consider in selecting the SNA gateway. Specifically, the way in which SNA layers are structured affects the trade-off between communications performance and normal Unix or local-area network processing. Faster processors, more advanced add-on boards and, in the case of Unix, additional addressable space, will make possible maximum communications performance during normal processing. In selecting an SNA gateway, buyers must look at the degree to which the connection's performance or normal processing is compromised and whether or not the trade-off is the best for their applications.

As discussed, the gateway's flexibility and ability to adapt to future technological advancements is important for both immediate performance today and applying the gateway to new environments in the future. Applications in future environments will include providing communications capabilities between the mainframe environment and interconnected, dissimilar local-area networks as well as networked Unix-based clusters.

The demand for a software gateway to the mainframe is increasing significantly in the corporate environment. Today's selection of a gateway is dependent on a solid SNA implementation. As important, product selection must also be dependent on suppliers that can provide a reliable product and responsive support in a relatively new, yet quickly maturing industry.

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Special Report

NET from SR/40

A third set of protocols, which is not available in products but could emerge as the ultimate local-area network standard, is being specified by the International Standards Organization (ISO).

The seven-layer ISO protocol effort has gained the support of the U.S. National Bureau of Standards and the European Computer Manufacturers Association; its

Level 4 transport layer protocol already is an accepted industry standard.

Many companies planning to supply network products have indicated that their initial offerings will be ISO compatible; even established vendors, who have been slow to move toward this standard, are likely to find themselves having to provide migration paths from their own protocols to the ISO set. The ISO protocols received a major push when they were an-

nounced as part of GM's MAP specification.

Other protocols

Two other protocol sets not specifically designed for local-area networks have evolved to fit the local-area network environment. IBM's Systems Network Architecture (SNA), with the world's largest installed network base, is based on a hierarchical topology designed for long-haul IBM networks.

Generally believed to be

the protocol set that will be used with the IEEE 802.5 token-ring technology over IBM's announced cabling scheme, SNA has been enhanced to permit peer-to-peer communications, making it better suited for local networking.

Like SNA, Digital Equipment Corp.'s Decnet protocols originally were conceived for point-to-point networks rather than local networks. Decnet Phase IV, however, is enhanced to per-

mit local-area network functionality.

The local-area network choice should be determined by a user's specific applications needs and by the immediacy of those needs.

Whatever the current needs, users should also keep in mind future requirements and be sure their local-area network vendors can provide the right migration paths — such as to SNA- or ISO-based networks — when they need them.

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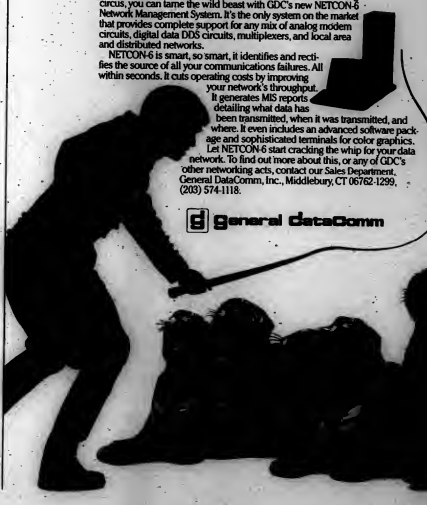
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Special Report

Integrated network management required to satisfy

By Steve Savitt
Special to CWS

In today's complex network environments, an integrated network management system is not a luxury, it is a necessity, unless you have money to burn on downtime and haphazard network growth.

There are five irrefutable principles of data communications. These principles have always driven data communications users into a panic, while driving data communications vendors to develop network control and network management products. The five principles are as follows:

- Networks obey the law of gravity; that is, they tend to go down.
- Networks always grow faster

than expected.

- Networks seldom grow in the direction planned.
- Price dictates technology.
- There is no such thing as state-of-the-art technology, at least not for more than 10 minutes. These principles have always been true. They are just truer now.

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The building blocks for network control systems are intelligent modems with diagnostic sensors that continually monitor the condition of the network.

The handwriting is on the wall for the traditional technical control center. Networks and network problems have simply become too diverse to be controlled manually. The solution is to automate the technical control functions, providing control from central nodes and data collection throughout the network.

Today's networks require uptime figures that 10 years ago were considered unrealistic. Network managers and users are now demanding uptime above 98%. The dream of 100% uptime can only be accomplished through a total systems approach. What is needed is an integrated system that is flexible enough to be tailored to individual management styles. Such a system will provide the information necessary to make fast, accurate decisions under the enormous pressure associated with running a network.

The building blocks for network control systems are intelligent modems with diagnostic sensors that continually monitor the condition of the network. All changes affecting transmission quality are reported back to the central site by the modems using either an out-of-band side channel or by multiplexing so that diagnostic information does not interfere with main channel data. Since the modems are monitoring the network 24 hours a day, problems are detected before the users are even aware a problem exists.

Isolating problems

If a problem is detected, a network control operator from the central site can perform tests to isolate the difficulty. Dial backup, switching in a hot spare modem or reconfiguring lines are all methods for temporarily maintaining the flow of data. The network manager then calls the vendor with test results. With the test results in hand, the vendor is able to give the manager a realistic repair time upon request.

Remote site personnel, who perform on-site diagnosis of network problems, are no longer necessary when using a network control system. Network control is now located at the central site where it belongs.

Network controllers automatically perform after-hours tests on the network, reporting the results by printing them in a sorted format. These printouts can be compared daily to look at trends on each line.

Automatic testing is critical, not only because manual testing is impractical, but because automatic testing also reports problems masked by system malfunctions and microprocessor modems that automatically adjust to line problems.

A network management system takes the diagnostic data it collects through the intelligent modems and dumps the information into a central data base. A network management module allows this information to be fetched or sorted in an unlimited number of ways.

Custom reports can be generated either automatically by the system or manually according to specific needs. All the pertinent information that is collected about each piece of equipment at each site can now be entered into this data base for future reference. Even information on the site itself, such as telephone numbers, contacts and special notes, can be

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Savitt is the director of marketing development for Infonet, Inc. (formerly Infonet, Inc.), which makes network control and management systems and data communications products.

Special Report

user uptime

entered into the data base. The data base can also be used to track office equipment, billing, telephone equipment or anything else.

One use for the historical information collected by the management system is problem management. Every problem can be logically traced from the time it is detected by the network control system to the time it is resolved.

These flexible data bases can be used for individual specifications, such as developing trouble tickets exactly like the ones currently in use. They can also keep track of trouble tickets during the repair process. This is possible because the two systems share a common data base. If the vendor has not closed the call within the specified time, the system

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The handwriting is on the wall for the traditional technical control center. Networks and network problems have simply become too diverse to be controlled manually.

reminds the network operator that no action has been taken. As each step is taken to resolve the problem, the open trouble ticket is continually updated. The ticket is closed when the problem is finally resolved.

A performance measurement feature can be added to management systems to provide protocol-related information such as response time, line utilization and traffic or error count. Such data is helpful for planning network growth and change. The ability to measure system utilization factors allows the planning division to project a realistic growth pattern for future business opportunities.

Built-in flexibility required

Transmission alternatives have crept into data networks. They include not only leased and dial analog lines but digital transmission, local area networks, packet switching, satellite, microwave, voice and data private branch exchanges, fiber optic, matrix switches, multiplexers, broadband, videoter, teleconferencing and value-added networks.

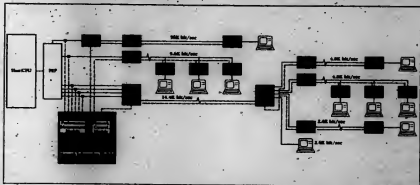
Not all of the above technologies will apply to every network, but most networks will most likely be supporting a few of them within the next several years.

This raises two important considerations:

- A network must grow in a controlled way to integrate new technologies effectively. This requires a network control and management system flexible enough to help manage current network problems and growth yet able to accommodate new technologies in the future.

- The integration of new transmission facilities is not a simple matter. In the search for a network data

See RETROGRADE SR/48



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the information needed for making network operation decisions.



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Special Report

MAIL from SR/41

track of how long individual trailers had been in use. After it installed the Apple machines, Intermodal designed programs that allowed employees at the terminals to log in trailer rental records daily and enabled the mainframe at headquarters to capture and compile the information.

After employees log daily rental information into their micros, custom-software resident on the Apples signals an auxiliary modem to send the data to the Burroughs mainframe over the elec-

tronic mail system. The mainframe produces a daily report that shows how long each trailer has been on lease and flags trailers that are approaching top per diem rates, Banks said. "We use it as a management information tool to keep track of people who are getting into that [top category]."

The system of daily reporting on trailer leases has enabled Intermodal to cut more than \$100,000 a year from its annual per diem charges.

Intermodal's field offices also use electronic mail to send messages to each other, to headquarters and to

railroad and shipping firms. The firm pays an average of 19 cents for each message it sends or receives. "What we're getting is instant certified mail at less cost than first-class mail," Banks said.

The electronic mail service interfaces with Western Union's Telex and TWX so Intermodal can exchange messages with companies that do not subscribe to Easylink.

Banks said that besides lowering Intermodal's business costs, the communications system has given the firm an immeasurable benefit because it increases employee produc-

tivity. Workers at the firm send and receive more than 200 messages every day. "When all that information was handled over the telephone, there was the usual amount of idle chitchat," he explained.

"Five minutes here and five minutes there really added up with that many phone calls."

The communications system eliminated "the problem," Banks said, "and our workers can concentrate more on their work."

Intermodal plans to write additional custom programs for its network.

'We're getting instant certified mail at less cost than first-class mail.'

—Chris Banks, Intermodal Transportation Services, Inc.

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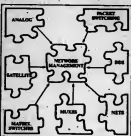
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INTEGRATE from SR/47

base management system, managers must look for a system that operates with hybrid networks. This means that managers are no longer required to distinguish between transmission types in designing their network.

In this way, state-of-the-art technology stays state-of-the-art. If a separate system was needed for each transmission facility, another computer facility would be needed just to manage the subsystems.

Take a Look at all the systems in the marketplace. Comparison shop.

Above all, make sure the system is flexible so it can be customized to your organization's management style.

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Special Report

Virtual networking systems tie micro clusters, giving

By David Mahoney
Special to CWS

When and if an ultimate personal computer network standard will appear is a matter that DP managers can only speculate about. However, with the use of a virtual networking system there is little to risk in setting up independent clusters of personal computer users and linking

them together using today's local-area network technologies.

The underlying advantage to this system is its flexibility in meeting the needs of tomorrow's network while providing an efficient solution for today.

A virtual networking system provides solutions to both short- and long-term

networking problems. Using a combination of existing hardware—in the form of a network server, coupled with sophisticated distributed systems software—it is possible to construct a networking solution that goes beyond the normal tasks of sharing disks and printers.

When building a network using the virtual networking

concept, planners can consider not only sharing files and printers but also sharing gateways to other resources. Research indicates that an efficient long-term solution is one in which numerous local-area networks are connected by a virtual networking system. Individual networks are then chosen based on their ability to han-

dle local traffic and serve the needs of individual work groups and departments.

Not every work group will require the same network services at all times. However, every group should have easy access to corporate resources, including other users, applications and data.

A virtual networking system operates efficiently within a multivendor network environment. In addition to the more common network tasks, virtual networks allow users to reach beyond their own network to access other corporate DP resources such as electronic mail, resource directories and gateways.

A virtual networking system has three conceptual elements, identified in Figure 1.

The first element, the front end, uses different technologies to connect personal computers to network servers. These technologies include various types of lo-

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Research indicates that an efficient long-term solution is one in which numerous local-area networks are connected by a virtual networking system.

cal-area networks, locally connected asynchronous lines and remotely connected asynchronous lines using modems. To be most effective, the virtual networking system must be independent of any specific networking hardware.

The second element of a virtual networking system is a comprehensive set of shared services. These services can include base-level services, such as a shared file system and shared print services, or sophisticated services, such as a network time and date facility, electronic mail and messaging, file and record locking, network security and full backup and recovery.

To build and manage departmental clusters of personal computers, the front-end and shared services elements are the only requirements. However, many corporations need to interconnect clusters between departments in the same building using high-speed

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Mahoney is president of
Bangon Systems, Inc., a
Waltham, Mass.-based man-
ufacturer of virtual network
systems.

Special Report

short-, long-term solutions

backbone networks or between geographically separate sites using private leased lines or public data networks. In addition, many frequently used resources in the corporate environment, such as data and applications, exist only on a mainframe system. Personal computer users must be able to access these resources effectively.

Therefore, a complete virtual networking system must provide a third element, the back end, to enable personal computer users connected by local-area networks to access these external communications environments through a network server. This back-end capability also accommodates large local systems with hundreds of personal computers at several locations within a single site by supporting the interconnection of multiple servers.

Ease of use

Network users must be able to find, move and use information. In a small network, this is not generally a problem. However, as personal computers are added and independent networks are installed, someone, usually a systems administrator, must keep track of the network resources and the users who need access to them.

The services software in a virtual networking system provides these functions. Using this software, a systems administrator gives each item on the network, including users, file volumes and printers, a unique English name, along with some information about each item.

The virtual networking system stores the names and information in a data base where they are easily found. When a user accesses a network resource, it appears as though that resource is resident on the user's own personal computer. If a user is not sure if a certain resource is on the network, a systems-resource directory provides a listing of all available resources.

The services software makes it possible for dissimilar computers to share resources by providing the information and data conversion necessary for the user's personal computer to view data stored on other micros, including incompatible ones. All the user sees is one integrated system.

Once a network environment is established, finding information and resources should be as easy as using the telephone system. With the phone system, a user needs to know only a unique identifier or name to communicate with another party.

In a virtual networking system, a user should be able

to locate a shared resource anywhere on the network simply by using its name. The user should not have to know the resource's precise location and should not be exposed to the complex software processes involved in finding that resource.

With so many corporate computer resources able to communicate, total systems

security in a virtual networking system is important. The system has top-level administrators who can add users to, and remove them from, the network. These administrators can assign passwords and configure individual user profiles to control each user's access to specific network information and resources.

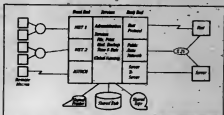


Figure 1. A virtual network consists of a front end, a back end and shared services.

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- 32. Programmer/Methods Analyst
- 35. QA/VP Director/Manager/Supervisor
- 38. Data Comm. Network Systems Mgmt.
- 41. Engineer/Scientific/MS/D/Technical Mgmt.
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- C. Microcomputers/Desktops
- D. Communications Systems
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SOFTWARE & SERVICES

Balanced contract best defense

Lawyer describes software acquisition contract that matches user needs with vendor commitment

By Maure McManamy
CW Staff

CAMBRIDGE, Mass. — Sloppy administration of a software acquisition contract can cost users valuable time and money.

That was the message of attorney Frank Aiello, a software contract specialist who spoke during a seminar titled "Legal Aspects of the Software Acquisition" held here recently. Aiello, a partner in the New York law firm of Contino Ross & Benedict, said a comprehensive software contract protects users against losses and can actually foster a better relationship with the software vendor.

Aiello said a balanced software contract helps avoid future legal disputes, matches a user's expectations with a vendor's commitments and sets up a time frame in which those commitments are to be met. The attorney outlined several factors to consider during the acquisition process. For example, while every software vendor goes to great lengths to protect its proprietary interests, there is usually nothing

in the software contract designed to protect a user's proprietary information. When negotiating the software contract, companies often reveal to the vendor a great deal about their operations — releasing budgetary information, customer reference lists and business plans that it would not release to competitors. "Challenge the vendor to give you the right to protect your confidential information," he said. Be certain that the contract is balanced, with protection provided for your company, he added.



Before working out contract details, outline your own priorities, Aiello said. Although pricing is an obvious consideration, it may not be as critical to the user as the package delivery date. Large corporations should be sure that they are not charged more for software simply because they are able to afford it, Aiello said. But, he added, "Squeezing a contract so the vendor is going to lose his shirt is not good for you either."

See LEGAL, page 70

Support series included in IBM software lineup

WHITE PLAINS, N.Y. — IBM's recent slew of software announcements, headlined by the introduction of several major VM-related products [CW Feb. 18], also contained about a dozen software support packages, including a series of products for IBM's newly announced 3298 Page Printer.

The following packages were among the releases:

■ Engineering/Scientific Support "System (E/SS) offering Release 1.1. Designed for the IBM 4300 series mainframes, the E/SS is said to ease the selection, installation, administration and maintenance of systems and applications software for engineering and scientific problem solving, business tasks, office support and database support in an IBM VM/CMS environment. According to IBM, the price for a typical configuration for a 47-month rental is \$184,285, including an initial charge

See SUPPORT, page 86

■ Nascet Corp. has added a development tool kit to its Case 2000 computer-aided software engineering environment/82

INSIDE

Systems Software/82
Application Packages/83

Top 10 Independent Software Vendors, 1983

Dollars (in millions)

56	Microsoft Corp.
59	McCormack & Dodge Corp.
63	Uccel Corp.
65	Micropro International Corp.
73	Informatics General Corp.
76	Chicom Systems, Inc.
76	Applied Data Research, Inc.
77	Computer Associates International, Inc.
105	Cultnet Software, Inc.
145	Management Science America, Inc.

Source: International Data Corp.

Total independent packaged software revenue for 1983 — \$3,916,000,000

Pondering IBM's plan



For months industry rumor-mongers, consultants, vendors and users alike waited for IBM to loose the latest, most powerful weapon in its evolving hardware arsenal.

Sierra — rumored code name for the new high-end mainframes. The word rolled off the tongues of pundits and prognosticators like raindrops off the windshield of a speeding Porsche. Market researchers

prepared reports predicting the specifications of the muscle machines to come, consultants conferred with their clients on what would soon be and vendors paused, waiting to learn what new problems or opportunities IBM's strategic hardware moves would pose.

Then, like Christmas morning, came announcement day. The so-called Sierra machines, embodied in the 3090 processors [CW, Feb. 18], were finally formally unveiled, and eager industry observers mobilized to report and analyze the IBM announcements. The months of anticipation were over at last.

See ARSENAL, page 63

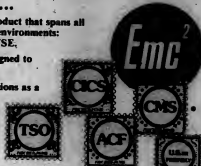
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SOFTWARE & SERVICES

Nastec offers systems development tool kit

SOUTHFIELD, Mich. — Nastec Corp. has added a systems development tool kit to its Case 3000 computer-aided software engineering environment.

According to a spokesman, the Designaid tool kit includes Graphicist, a full screen editor for documentation and design support; the Design Dictionary containing

design and data elements; and Design Analyzer, a validation program for scanning data flow diagrams and Cobol source statements.

Case 3000 is designed to improve productivity in systems development and support.

Integrated tools

The product is a collection

of integrated tools organized into three components: a development series consisting of tools for technical professionals; a Management series of project planning, control and quality assurance tools; and an operating environment consisting of options for workstation type and modes of information sharing.

Nastec also announced that Designaid is available on the IBM Personal Computer XT, Personal Computer AT and 3270 terminals, in addition to Convergent Technologies, Inc.'s workstations. The Designaid tool kit is priced at \$4,900.

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■ Sterling Software Marketing has announced that its Data management system, DMS/OS, new supports IBM's 3480 tape cartridge system.

DMS/OS users are not restricted to the compatibility mode, the vendor said, but may also install and use the device in full function mode. DMS/OS operates under IBM's MVS and MVS/XA and Fujitsu Ltd.'s OSIV/F4 operating systems.

DMS/OS pricing starts at \$14,000 for a permanent license, the vendor said.

Sterling Software Marketing, 1007 Seventh St., Sacramento, Calif. 95814.

APPLICATION PACKAGES

■ Sideral Corp. has announced an automated bank test key software package that makes it possible to receive, transmit and test electronic funds transfer orders and other messages requiring authentication on the same equipment.

The package runs on Sideral's Micronet 8 message communications terminals under the company's proprietary operating system.

The package, which can be customized to include features that individual banks may require, has two modules. The test key module is a series of tables determined by algorithms that also includes a fixed number for each correspondent or branch bank. A five-level password security procedure module can include combination of message preparation, text preparation, access to operator utilities, transmission of messages and supervisory access to passwords.

The test key module costs \$5,000, and the security module is priced at \$3,000.

Sideral, 9600 S.W. Barnes Road, Portland, Ore. 97225.

■ Datamate Co. has announced Pastfile, a program that uses precompiled code to allow the user to build an information storage and retrieval system quickly by responding to a series of menu prompts. The package is for use on NCR Corp.'s 9500 mainframes under NCR's ITX operating system and on NCR's I-Tower supermicrocomputer under Ryan-McFarland Corp.'s RM/COS operating system.

According to a spokesman, each system set up with Pastfile includes a customized version of Enquiry, Datamate's English-language report writer and query processor. This function allows

Continued on page 63

SOFTWARE & SERVICES

ARSENAL from page 61

But wait.

There was there all right. But the announcement of the top-of-the-line mainframes was piled together with some 25 IBM programming announcements — several of which were among the most significant software introductions the world's leading software company, IBM, has made in the last half decade. On the suspicious occasion of announcing the most powerful computer it has ever designed to offer, IBM took seers and sages by surprise and loaded a torrent of major software introductions and enhancements on an unsuspecting industry.

Although industry watchers were quite prepared to dispense their opinions concerning the ramifications of the 3090 series and its bells and whistles, IBM's software moves caught many off guard.

Some other companies, especially those in the software marketplace, spend a great deal of money putting together glossy press packets outlining exactly what their marketing strategies are and how their new products fit into said strategy.

Not IBM. The blue force from Armonk is notoriously tight-lipped about its future plans and sees little need to map out its product strategies. Thus, it will take a fair piece of time for both users and analysts to make some sense of the mass of software announcements IBM rained on the industry mid-month. Indeed, in order to begin that Herculean task, any interested party must first wade through the stack of programming announcements — known as ivory sheets — that IBM unloaded on the world.

But like the quasi-art, demitence of terminology, which has won converts in light of the recent poor health of top Soviet leadership, decrypting the hidden messages in these software announcements promises a wealth of new insights into the workings of one of the world's largest companies. Surely, amidst all the product announcement smoke, there is some fire and an IBM software strategy waiting to be unearthed. On the surface, the software announcements seemed to raise a multitude of questions for each one they answered.

For example, why has IBM chosen to go forward so forcefully with VM, an operating system that earned favor among users but was thought by many to be the neglected child among IBM's three major operating systems (DOS, OS/MVS and VM)? And, why did IBM choose to go forward in high gear with VM at this time? What significance do the VM-related announcements, which seem to make VM a viable and attractive alternative across the entire range of IBM's mainframes, hold for the future of DOS? What effect will they have on the flagship of IBM's software world, MVS/XA?

And what about AT&T Unix? For years, users and observers have debated whether IBM would enter the Unix fray. Enter the fight it did, and in a big way. Big Blue's decision to go with its new-found rival, Unix System V, offers some fascinating fodder for analysis. Was it simply a move aimed at saving IBM the cost of developing a new operating system with Unix-like capabilities? Was it simply IBM's concession to the engi-

neering/scientific market and to the growing cadre of die-hard Unix aficionados? Or is IBM hoping to steal AT&T's hole card and, thus, its thunder? Will IBM's large-systems Unix implementation provide a consistent operating environment across the entire range of its hardware, from the Personal Computer — PC/XT and Microsoft Corp.'s Xenix — to mainframes under IX/370? The above are just a sampling of the issues raised by IBM's software plays of the last couple weeks. And, considering the long lead times before most of the announced software products will actually become available, there will be plenty of time for IBM watchers — a group that includes thousands of users — to ponder IBM's master plan.

Enjoy the puzzle.

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SUPPORT

From page 61

and some monthly licensing charges. The product will be available in mid-March.

■ The E/S3 Productivity Facility (PF) Release 1.1, E/S3 PF help for users of the E/S3 facilities through dialogues and examples on installation, administration, maintenance and applications-oriented tasks.

A spokesman said E/S3 PF dialogues lead the user to the appropriate application programs and can be tailored to specific users. The one-time charge for the E/S3 PF, available in mid-March, is \$2,000, and the monthly license charge is \$100.

■ The E/S3-Entry program is designed for configurations of the IBM 4300 series mainframes supported by

the newly announced VM/Entry (CW, Feb. 18). E/S3-Entry is an interactive IBM CMS engineering support system. Task-oriented dialogues present a view of applications programs to the user. Four optional packages provide applications support for problem solving, professional text processing, data base management and presentation graphics. E/S3-Entry carries a one-time charge of \$40,000 for the VM/Entry.

Additional software is optional.

■ IBM announced Release 3 of its System Modification Program/Extended (SMP/E). SMP/E runs under MVS/XA and MVS/SP. Dialog extensions, non-editing capabilities, extended zone descriptors and processing improvements have been added to the product. SMP/E carries a base license charge of \$1,800 and a monthly charge of \$300.

■ Resource Measurement Facility (RMF), Version 3, Release 3 for MVS/XA users features ease-of-use enhancements, expanded storage support for the recently announced 3090 processors and support for I/O configurations on the 3090 processors. The product's initial license charge is \$2,100, with a \$700 monthly charge.

Other announcements

Additional printing support facilities included the following:

■ Print Services Facility/MVS, Release 1.1 provides device and resource management support for the recently announced IBM 3820 Page Printer and the 3800 Printing Subsystem. The Print Services Facility/MVS performs page processing that organizes data based on page formatting instructions. New page/report formats can be created independently of the applications program. The base license charge for the Print Services Facility/MVS is \$4,260, and the monthly license charge is \$300.

■ Print Services Facility/VSE Release 1.1 for the 3820 printer is designed to provide device and resource management support operating under VSE in a VSE/Power environment. The Print Services Facility/VSE 1.1, available in the third quarter, has a \$2,000 initial license charge and a \$100 monthly license charge.

■ Print Services Access Facility/MVS, which is an interactive, menu-driven system that simplifies the selection of printing parameters used to print data on the IBM 3800 printing subsystem Model 3 and the 3820 printer, operates under MVS/SP or MVS/XA environments. The product will be available in the second quarter and has an initial license fee of \$700 and a monthly charge of \$120.

■ Print Management Facility/MVS Release 1.1, which provides menu-driven utilities and 67-char. sets to support the capabilities of the 3280 Page Printer. The product will be available in the second quarter and is priced at \$825, with a \$275 monthly license charge.

■ Page Printer Formatting Aid/VSE Release 1.0 is a product that allows the user to define format and page definitions for use with the 3820 printer. VSE Release 1.0 will be available in the fourth quarter. The release carries an initial license charge of \$250, and a monthly license charge of \$75.

The National Accounts Division of IBM's Information Systems Group is located at 1133 Westchester Ave., White Plains, N.Y. 10604.



OUTDRAW THE COMPETITION FOR ONLY \$500

Extend the capabilities of your IBM PC. With DFDdraw from McDonnell Douglas Automation Company, you can now draw and edit Data Flow Diagrams, using DFDdraw's automated template of all data flow diagram graphics symbols and its comprehensive diagram manipulation features.

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DFDdraw operates on an IBM PC, XT or AT having at least 256K memory, with standard IBM color monitor and color graphics monitor adaptor. Compatible products are also supported.

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A two-bit hard disk
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If your data management system is obsolete, you may be stuck with a million bytes of obsolete data.

IBM's new hard disk system, the 3380, is the most sophisticated system to meet the needs of today's data management systems. And the 24 hours of error-free operation of the 3380 is a single unit of time that leaves the

data management system — and the data — safe. The 3380 comes from IBM's sophisticated system to meet the needs of today's data management systems. And the 24 hours of error-free operation of the 3380 is a single unit of time that leaves the

SOFTWARE & SERVICES

Continued from page 62

the user to perform comparisons and print or display a sorted report. Inquiry will format multiline reports automatically. *Partfile* is priced at \$1,495 until March 31.

Dainemate, Suite 188, 4135 S. 100th East Ave., Tulsa, Okla. 74146.

■ **Software Concepts, Inc.** has announced that it will market the *On-line Research and Banking System (Orbs)* developed by Chemical Bank in New York to other banks.

Reportedly, the Orbs system runs on the IBM 4341 model under IBM's MVS operating system and was designed to operate with IBM's check capture system. The reconciler can scroll through magnetic ink character recognition detail or search for specific data, find and identify sin-

gle, free items, out-of-balance deposits, balances and blocks.

The price of Orbs is \$60,000. *Software Concepts*, Suite 1450, 250 Piedmont Ave. N.E., Atlanta, Ga. 30303.

■ **Hewlett-Packard Co.** has introduced three text and graphics software packages for its Series 300 engineering workstations.

Text Editor/200, which sells for \$275, reportedly provides users with the capability to write and edit memos, letters and reports. The product is said to include electronic cut-and-paste capabilities, recall of up to 10 lines of deleted text from memory and a key redefinition function.

Graphics Editor/200, which sells for \$445, reportedly is a drawing program for creating presentation

graphics including flowcharts, process-flow diagrams, organizational charts and block diagrams. The product is said to include a menu-based command system, on-line documentation and a windowed screen.

Data Grapher/200, available for \$295, is said to automatically perform calculations and plotting. The product includes curve approximation, pie charts and bar charts, automatic data entry from data files and output options. Each of the three packages requires a minimum of 512K bytes of memory.

Hewlett-Packard, 3000 Hanover St., Palo Alto, Calif. 94304.

■ **Radlan Corp.** has announced *CPS Graphic Editor*, which allows users of the company's CPS series of contour mapping software to create

and edit maps interactively.

CPS Graphic Editor is said to run on Digital Equipment Corp. VAX series computers under VMS operating system and on IBM computers under MVS and CMS. The package is written in Fortran and incorporates Precision Visuals, Inc.'s DI-3000 core graphics software interface.

The package also allows users to generate new maps or to modify existing maps created through another CPS product or through the user's own applications program. The user can copy, move, change or delete items that appear on the map and can add such elements as title boxes, text notation, surface features and graphics symbols and other artwork.

The price of the system is \$27,000. *Radlan*, P.O. Box 9545, 5501 Mezac Blvd., Austin, Texas 78763.

■ **List Processing Co.** has announced a software package said to perform name and address processing functions on IBM computers running under IBM's OS or DOS operating systems.

Finalist reportedly affixes five-digit Zip codes, carrier route codes and Zip + 4 codes to mailers. The package also features street address verification capabilities, including the ability to correct incomplete addresses and typographical errors, truncations and misspellings.

The price of the package ranges from \$14,900 to \$49,600, depending on the type and size of the user's data base.

List Processing, 555 Waters Edge, Lombard, Ill. 60148.

■ **Encocomp, Inc.** has introduced a marketing-oriented software system written in Cobol that runs on Data General Corp.'s MV series superminicomputers under DG's AOS/V8 operating system.

The integrator order entry processing system consists of modules for marketing, product and financial control. Each software module is priced at \$30,000. The system can be ordered as a complete turnkey system with prices starting at \$175,000.

Encocomp, P.O. Box 24435, Indianapolis, Ind. 46224.

■ **Computer Concepts, Inc.** has introduced *BES Search*, software for use with its Officepower office automation system. *BES Search* reportedly permits full text information retrieval.

BES Search is said to permit users to electronically skim private and public data bases and to retrieve free-form and structured text or data. *Officepower*, an integrated WP and DP package, is said to offer mail management, electronic mail and decision support functions.

BES Search, which runs with *Officepower* on Computer Concepts' Power 6 minicomputer, reportedly permits captured text to be retrieved on-line and displayed, edited, filed, printed or electronically mailed. It is priced at \$45,000.

Computer Concepts, 87 Humboldt St., Rochester, N.Y. 14608.

■ **Vector Automation, Inc.** has announced a three-dimensional wireframe geometry product that is an add-on to its *Yieldo 3D* drafting

Continued on page 70



The TI 855 microprinter. No other printer says better so many ways.

Feature for feature, no other microprinter can match the versatility, compatibility, reliability and productivity of the *OMNI 800™* Model 855 microprinter. Hatch why.

Two Printers in One. With the TI 855 you get the speed of dot matrix draft copy. Plus the precise clarity of the most advanced matrix technology for letter-quality print. It's two printers in one — at one low price.

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SOFTWARE & SERVICES

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When negotiating payment schedules, be sure to examine the software company's financial information, Aiello advised. A small software house could be relying on a single buyer's contract to stay solvent. If the vendor runs out of money halfway through the project, the buyer will lose not only the software but valuable applications use time.

Payment upon delivery is the traditional reimbursement method for most customers. But when working with a small software house that may not be able to afford project carrying costs, it might help to make several "progress payments" — payments made over a period of time — withholding the vendor's profit until the software is tested and accepted.

Overall, Aiello said, software doc-

umentation is the key to the acquisition process. "If I were a DP manager, I would make sure that my lawyer understood documentation," Aiello said to instruct counsel to spend several hours on the documentation section or face the risk of future complications. "When the software is not working, you have to find out what's not working," Aiello said, adding that documentation is the first place to look.

When it comes to documentation, make no assumptions, Aiello cautioned. Buyers must make sure to know what kind of documentation the vendor will provide. Thus, the software contract should outline what methodology will be used by the vendor in drawing up the documentation. "People assume that the documentation they will be provided will be the type of documentation

they are familiar with," Aiello said.

Negotiating the software acceptance testing process, Aiello said, is "the most important concept in the contract, outside of the warranty and liability sections." Vendors and users should make sure the contract includes criteria for the acceptance test and the procedures to be followed. The test guidelines should be in place when the contract is signed, he said.

"Be leery of acceptance test clauses claiming that after so many days of use you have automatically accepted the software," he said. These so-called free use periods are sometimes a "seductive method" to get users to accept the software, he noted.

Finally, Aiello said, "If you encounter a vendor who is recalcitrant about negotiating a contract, don't do business with that vendor."

Quick Study!

New UDS 9600 bps Fastpoll Cuts On-line Training Time 33%

The new 9600 bps fastpoll mode from Universal Data Systems means extra throughput for your polled multipoint network! Until now the fastest on-line training time available anywhere has been 12 milliseconds. Since training time is non-productive time, UDS has increased system throughput by trimming the training cycle to 8 ms, producing a corresponding increase in overall system efficiency. The device is suitable for operation over unconditioned four-wire leased lines in either fastpoll or

conventional CCITT V.29 mode. Integral test features allow for system performance evaluation and fault isolation within the communications link.

The UDS design incorporates LSI and microprocessor technologies to achieve significant size and power consumption advantages. For detailed specifications, contact Universal Data Systems, 5000 Bradford Drive, Huntsville, AL 35805. Phone 205/837-8100; Telex: 752602 UDS HTV

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Circle 10 on Reader Service CardContinued from page 68

software. The package runs on Vector's Cadmax-II and Cadmax-III computer-aided design and drafting systems, which run under Vector's proprietary operating system.

The 3D Wireframe Geometry software module allows the construction, editing and viewing of three-dimensional geometry with the same menu format used in the Vads 2D software.

The 3D Wireframe Geometry package provides full-function three-dimensional design capability which permits up to 100 user-defined views of a model with all view directions, scale-factors and layouts under the operator's control.

The price of the 3D Wireframe Geometry module is \$4,000 per workstation.

Vector Automation, Village of Cross Keys, Baltimore, Md. 21210.



COMMUNICATIONS

Honeywell unveils MAA

Architecture links factory automation products

By Edward Werner
CW Staff

NEW YORK — A communications architecture that reportedly could be used to interconnect all of its factory automation products, from sensors to minicomputers, was announced here last week by Honeywell, Inc.

Honeywell said its Manufacturing Automation Architecture (MAA), available in late 1984, will consist of several local-area networks, the main two of which will use General Motors Corp.'s Manufacturing Automation Protocol (MAP). MAP, a protocol being developed by GM and several of its factory automation vendors, will allow the products of different vendors to communicate over a token bus local-area network.

According to William W. George, Honeywell's executive vice-president of control systems, the top-most network in the MAA will provide broadband communications between the various minicomputers in use at the plant management level for such functions as engineering and production scheduling. A mid-level, broadband lo-

cal-area network will allow supervisory workstations to communicate with sensing and control devices on the factory floor.

The two local-area networks roughly encompass the systems of information and control in a factory, systems that Honeywell President Edson Spencer said must be integrated in order for manufacturing automation to take place. "By integration we mean the ability not only to supply the major pieces but also to get all the pieces to work together — whether we supplied them or not," he said.

Most of the hardware to make the MAA a reality already exists, according to Charles Johnson, Honeywell's group vice-president for large computer and manufacturing systems. Still needed, however, is the network communications software and a universal controller that will connect shop floor networks of sensing and control devices to the supervisory-level local-area network, he said.

Two new products to support the MAA, the Work Center Controller 1250 and the Plant Management System, were also un-

See **FACTORY** page 72

Harris offers tandem switch to link PBXs

NEW YORK — Harris Corp. recently announced a tandem network switch that can be used to interconnect multiple types of private branch exchanges (PBX) and — where corporations interconnect separate switches with private lines for intracorporate calling — reduce networking costs by up to 50%.

The Harris 30-30 Integrated Network Switch is a digital switch that can be configured with up to 1,920 fully nonblocking ports (each port rated at 36 hundred call seconds or 360C3). Each port reportedly has a 64K bit/sec communications channel for pulse code modulated (digitized) voice or data and another 64K bit/sec channel for signaling.

Harris reported that the 30-30 ports can be software-configured to accommodate 256 trunk groups, with a maximum of 127 trunks per group. The switch is said to be compatible with the routing and billing protocols used in the PBX products of AT&T Information Systems, Northern Telecom, Inc. and Bolt Berne.

The tandem switch can be used with multiplexers, tie lines, WATS and private lines so that the most economical routing patterns can be established between switches, the company claimed.

In application, a large dispersed corporation would use two 30-30s linked together in a tandem fashion with a high-capacity intermachine trunk such as T1. Each 30-30 would be located to support geographical concentrations of PBXs used within corporate affiliations, according to Harris.

When a person in one office wanted to call someone in a branch office, he could place the call by keying in what amounts to an extension number instead of having to place it as a local call. The cost of the dedicated trunk between the 30-30s is thus used to best advantage because of heavy local use.

Because a large percentage of a company's calling is done internally, tandem switching over dedicated facilities is generally preferable to having the calls placed through the local telephone company under tariffs that may be usage-sensitive.

But the 30-30 goes that ability one step further.

See **SWITCH** page 73

■ **Vitalink Communications Corp.** has added Ku-band satellite support to its line of private satellite network offerings/72

■ **NCR Corp.** has introduced three communications programs for its Tower 1632 and Tower XP superminicomputers that provide access to SNA nets/73

■ **Case Rixon Communications, Inc.** has introduced a statistical multiplexer designed for Hewlett-Packard Co., Wang Laboratories, Inc. and Tandem Computers, Inc. minicomputers/73

■ **Comdesign, Inc.** has announced two enhancements for its TS-600 Switching Statistical Multiplexer. Synchronous Channel Option and Dual Link Option/74

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Voice/Data Communications/73

Software/73

Multiplexers/Modems/73

Test Equipment/74

Auxiliary Equipment/74

Net management system flags, bypasses failed components

ROCKVILLE, Md. — Ocean Data Systems, Inc. has announced a network management system that can be used to identify, isolate and bypass failed network components and lines.

The Medium Network Management System is based on a Digital Equipment Corp. VAX-11/725 for low-end systems that support a network with at least 96 circuits and a VAX-11/780 for larger networks. This centralized processor interacts with devices in the field called Network Diagnostic Units (NDU).

The Zilog, Inc. 280-based NDUs wrap around remote data communications equipment, providing monitoring functions for both the analog and digital side of network devices. The NDUs, which can only be used with analog network circuits, are monitored by the central VAX using side-band signaling at 75K bit/sec.

The NDU's intelligent analog or digital interfaces permit diagnostic tests to be carried out under central control for any type of terminal, modem or line. The digital interface operates at speeds up to 19.2K bit/sec, enabling the monitoring of multiple data circuit conditions such as receive-carrier status, terminal streaming, signal quality and modem and terminal power failure. Tests include analog-to-digital interface monitoring, on-line error rate testing, polling and loopback tests for analog and digital interfaces.

The product features fault detection and analysis and offers a color graphics option to illustrate network status and condition changes, the vendor said. Three levels of graphics detail are supported, including a full geographic user-definable overview of the network, schematic repre-

See **OCEAN** page 72

AT&T, telecom firms OK draft pact to construct undersea Pacific cable

KAUAI, Hawaii — AT&T, 21 other telecommunications companies and telecom agencies from several countries took the first steps toward construction of a \$593 million transoceanic communications system at a meeting here last month.

The companies and agencies approved a draft agreement to construct and maintain the first undersea cable to span the Pacific Ocean with a laser-powered, digital lightwave communications system. The Hawaii 4/Transpac 3 fiber-optic system is tentatively scheduled to be-

gin service on Dec. 31, 1988.

The light-wave system will stretch nearly 7,200 nautical miles across the Pacific. It will include nearly 560 undersea regenerators located approximately 30 nautical miles apart. The cable system reportedly is designed to operate at 180M bit/sec. Hawaii 4/Transpac 3 will be able to transmit digital voice, data and video signals at a rate reportedly equivalent to approximately 37,800 simultaneous telephone calls.

More information is available from AT&T, Basking Ridge, N.J. 07920.

AT&T muxes tie data channels into single transmission facility

MORRISTOWN, N.J. — AT&T Information Systems has announced three products designed to combine multiple data channels into a single transmission facility for use with AT&T's Dataphone II Level IV network: the 718 Stat Mux, the 719 Networker and the 735 T-Mux.

The 718 Stat Mux reportedly is a statistical multiplexer that supports four to 32 channels of asynchronous and synchronous data. Individual channel speeds can range up to 9.6K bit/sec. On the link side, the device can be used with coaxial, fiber-optic,

satellite or metallic transmission facilities, according to the vendor.

The 719 Networker is said to be a statistical multiplexer and data packet switcher that provides an intelligent link to Dataphone II Level IV. It can be used as a stand-alone 32-channel computer port concentrator or, using its packet-switching capabilities, can be used to tie 718 Stat Muxes together. In the latter configuration, the 719 Networker can be used to reconfigure other network multiplexers and send error conditions to a

See **CONSUMER** page 73

COMMUNICATIONS

Ku-band satellite support added to Vitalink networks

MOUNTAIN VIEW, CALIF. — Vitalink Communications Corp. has added Ku-band satellite support to its line of private satellite network offerings.

Called the K-Series, the new series uses Ku-band satellite communications frequencies, which reportedly enable the services to be used even in terrestrial microwave congested areas.

According to Vitalink, the K-Series is sold as a turnkey service that includes customer-owned, on-premise earth stations; on-demand satellite transmission and 24-hour network

management and technical support. Applications such as point-to-point computer links, local-area network interconnections and modular video-conferencing systems are also included.

Vitalink also offers satellite services that use C-band satellite frequencies.

K-Series earth stations range in price from \$40,000 to \$50,000. Monthly usage fees range in price from \$300 to \$1,000.

Vitalink Communications is located at 1360 Charleston Road, Mountain View, Calif. 94043.

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presentations of user-specified sub-networks and a six context view that can be used to show configurations of individual devices such as modems, switches and control cards.

When the system is first installed, the network and its various components are identified. This network definition cycle includes when and from whom network devices were purchased, what kind of warranties are carried on network equipment and who services the units.

In operation, network alarms are filtered by the system so that only important problems are forwarded for actual diagnosis. Once the problem is flagged, the operator intervenes to perform tests or to switch, where possible, backup devices into operation. At this point in the "incident-handling" mode, incident reports are created.

Reports are created.

Data compiled while the failure is being handled can be later accessed in the "statistics" mode, enabling the operator to request and generate, in either chart or tabular form, summaries of incidents and reports on network reliability, availability and performance.

Medius reportedly can handle synchronous and asynchronous networks, independent of media and components used, at speeds from 50 bit/sec to 10.2K bit/sec; it can support up to 16,000 test points.

Pricing for Medius averages \$1,200 to \$1,400 per circuit. A 96-circuit system costs approximately \$135,000.

Ocean Data Systems is located at 6000 Executive Blvd., Rockville, Md. 20853.

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veiled at the architecture's debut.

The WCC 1250, a microcomputer being manufactured by Honeywell's Datacom, Inc. subsidiary, can reportedly automate collection and processing of work-in-progress data and other production information and act as a decision support system for shop floor supervisors.

It reportedly will also operate as a stand-alone unit or, depending on its capacity, support anywhere from two to 32 users under either AT&T's Unix System V or a Honeywell proprietary multiuser operating system.

Plant Management System

Also announced was the Honeywell Plant Management System, a system based on the Honeywell DPS 6 minicomputer that can reportedly be used to capture and manipulate data from process controllers. As such, it will have applications mainly in the process industries, such as refining and chemical and power production, according to Honeywell.

The WCC 1250 is based on the Motorola, Inc. 68000 processor and will be priced starting at \$10,000 with rack-mounted systems. Those for large shop floors will cost between \$30,000 and \$100,000. Software is priced separately, with licenses ranging from \$20,000 to \$100,000.

The Plant Management System will be priced at approximately \$80,000, with full systems ranging in cost from \$750,000 to \$1 million.

Statement of support for MAP

Honeywell's announcement of its MAA also marked its first statement of support for MAP, a spokeswoman said. Though it is not one of the original seven factory automation vendors who in 1984 announced support for MAP, the spokeswoman said Honeywell has long supported the International Standards Organization Open Systems Interconnect guidelines, on which MAP is based.

The MAA will not totally implement MAP on all of its local-area networks, however. The Local Control Network, a separate branch of the architecture for plants that use process controllers, will not use MAP, at least at present, and would therefore require Honeywell-compatible equipment, according to Honeywell's George.

Process controllers are used in industries that do both manufacturing and processing, such as the food and pharmaceuticals industries.

"Enable is everything
Symphony hoped to be."

PC Magazine



COMMUNICATIONS

CHANNELS from page 71

central diagnostic system, AT&T reported.

The 736 T-Mux is a time-dividing multiplexer for use with T1 digital communications facilities.

The product is said to be able to accommodate a maximum of 64 channels at speeds from 1.5K to 768K bps/sec.

The 718 Stat Mux and the 719 Networker will be available generally beginning in March. The 736 T-Mux is slated to be available in April. Price ranges are \$3,200 to \$9,000 for 718 Stat Mux, \$5,000 to \$11,000 for 719 Networker and \$20,000 to \$72,000 for 736 T-Mux, depending on configuration and options.

AT&T Information Systems is located at 100 Southgate Pkwy., Morristown, N.J. 07960.

VOICE/DATA COMMUNICATIONS

Radax Electronics, Inc. has announced Network Control Switching System, capable of switching out faulty lines or modems.

With a dumb terminal, a user can access, switch and monitor 1,024 channels, the vendor said. A monitor bus provides a user with monitoring and testing access to any RS-232 card in a network.

In case of a power failure, magnetic latched relays lock the system into the last switched position, and a battery backup will continue operation when power is restored.

The switching system is menu-driven and has report writing capabilities.

The package costs \$200 per chan-

nel. Models range in size from 16 to 1,024 channels.

Radax Electronics, 79 Hazel St., Glen Cove, N.Y. 11542.

SOFTWARE

NCR Corp. has introduced three communications programs for its minicomputers: SNA Physical Unit Type 3 (SNA/PUTE), SNA Remote Job Entry (SNA/RJE) and SNA 3270 Data Stream Capability (SNA/3270 DCS).

SNA/PUTE allows one of the NCR computers to act as a Systems Network Architecture (SNA) cluster controller and communicate through an SNA network as an IBM SNA/PU Type 5 product, the vendor said.

SNA/RJE, which works with SNA PUTE, enables a user to submit jobs to an IBM host and route the output to a computer running AT&T Unix.

SNA/3270 also works with SNA PUTE DCS and provides IBM 3270 series terminal emulation capability for NCR 7900-1 or 7901 stations.

SNA/PUTE costs \$1,560, and SNA/RJE and SNA/3270 cost \$900. NCR, 1700 S. Patterson Blvd., Dayton, Ohio 45478.

MULTIPLEXERS/MODEMS

Case Rixon Communications, Inc. has introduced DCE312, a statistical multiplexer designed for Hewlett-Packard Co. HP 3000 series. *Wang Continued on page 74*

"Enable may legitimately claim to be the only package you'll ever need."

*Computer Buyer's Guide and Handbook
November, 1984*

"...if an office is looking to step up to cross-the-board integration with a multitude of functions...this is the one program to seriously consider."

*Personal Computing
March, 1985*

"Offering true integration among all of its applications modules...[Enable] is a powerful production tool that can serve everyone in the office, from data entry personnel to the vice-president of marketing. Each module could stand as a full-powered application in its own right."

*PC Magazine
February 19, 1985*

"Enable, a five-function integrated system from The Software Group, merits a close look by any individual or organization interested in a solid package that is well balanced in all of its applications."

*Popular Computing
March 1985, Paul Goldner, Raymond Head, Yoram Lerman, Michael Wilding*

"Quite simply, this package has so many outstanding attributes that even the worst skeptics of integrated software have to be impressed. The spreadsheet is very close to 1-2-3; the word processor combines the best thinking of WordStar, Multimate, Volkswriter, and Easy Writer; the data base offers the functionality of dBASE II, but with many of the ease-of-use features of PowerBase; and the program offers business graphics and telecommunication. Taken as a whole, Enable surpasses the functionality of Symphony, Framework, Aura, and Open Access."

*IBM PC Update
December, 1984*

Enable first in "Performance" rating—including speed and capacity of all modules tested. Enable first in

"Versatility" rating—including power and functionality of all modules tested. Enable rated first in overall evaluation of the word processor module.

*Software Digest Ratings Newsletter
Rating of 15 Integrated Products
December, 1984*

"Enable welds its five applications together with outstanding integrity—yet each is exceptionally full-functioned in its own right."

*Business Computer Systems
January, 1985*

"Enable is one of those programs that can be up and running with most of the features you need in a few hours. As you need more, you can get deeper into the program and learn at your own pace."

*InfoWorld
January 21, 1985*

"...a birdlike appetite for RAM keeps this virtual-memory system sprightly, even in stock MS-DOS machines."

*INC.
February, 1985*

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You can also trade up from Symphony if you, too, find it isn't all you hoped it to be.

The trade up is in effect until April 30, 1985. Merely show proof of purchase (keep your old disk). After April 30, the full (and very reasonable) suggested retail price is \$695.00.

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SWITCH from page 71

When all dedicated trunk routes in a network are busy, the 30-20's Extended Software Defined Network least-cost routing capability allows calls to be routed around the leased facilities and into the public switched network.

While this capability might seem, at first glance, to end up costing the user more per month, it can in fact lower the user's monthly costs by up to 30%.

This is achieved by enabling networks to be designed without the need to accommodate peak traffic volumes. By designing the network to support less-than-peak traffic loads, fewer dedicated lines are needed between tandem hubs, resulting in savings. The 30-20 handles peak-hour traffic by automatically routing it over a dial-up service such as Wats.

In a cost-benefit analysis of the 30-20 performed by Telco Research, an independent consulting firm in Nashville, this capability resulted in savings that ranged from 19% to 30%.

Savings vary with traffic

The results varied by the amount of intracompany or on-net calling specified in each scenario, hours of usage and the number of nodes and locations considered. Companies with a higher percentage of on-net traffic generally enjoyed the highest savings.

The switch architecture is said to be modular and scalable in a fully redundant configuration providing automatic switchover in case of system failure.

Other features of the 30-20 include up to 100,000 security codes of up to 15 digits each, any nine of which are actually analyzed, and support of both direct inward dialing, which permits incoming calls to be routed directly to a specified station, and direct inward system access, permitting off-net users to access tie lines or Wats facilities, the vendor said.

Call detail recording software is said to be able to collect billing and usage data for more than 25,000 calling records, which can be stored on disk and output to an external processing system when polled.

Scheduled for delivery in March, the Harris 30-20 will range in price from \$48,000 to \$190,000, depending on size and software options desired.

Harris' Digital Telephone Systems Division is located at One Digital Drive, Norvitz, Calif.

COMMUNICATIONS

Continued from page 73

Wang Laboratories, Inc. 2300 series and Tandem Computers, Inc. TP06 minicomputers.

The product attaches to these minicomputers via an RS-232 port and supports eight asynchronous terminals, the vendor said. DCS812 has a maximum transmission speed of 9.6K bit/sec with an aggregate rate of 19.2K bit/sec.

The product's supervisory port automatically detects speed and parity of supervisor's terminals and leads a user through the steps necessary to configure and test a system.

DCS812 costs \$15,000 for a four-port model and \$19,000 for an eight-port model.

Case Rison Communications, 2120 Industrial Pkwy., Silver Spring, Md. 20904.

Comdesign, Inc. has announced two enhancements for its TS-600 Switching Statistical Multiplexer — Synchronous Channel Option and Dual Link Option.

The Synchronous Channel Option allows up to four of eight input channels to operate synchronously or asynchronously, handling some protocols in transparent mode and statistically multiplexing selected protocols in a nontransparent mode.

Channels with synchronous capability support asynchronous, Synchronous Data Link Control or bi-synchronous protocols. Full- and half-duplex transmissions are supported at speeds from 1.2K bit/sec to 9.6K bit/sec. Dual Link Option per-

mits TS-600 units in a point-to-point application to be connected with two links, the vendor said. Links can be individually configured and operate at speeds up to 19.2K bit/sec.

Synchronous Channel Option costs \$600, and Dual Link Option is \$500.

Comdesign, 751 S. Kellogg Ave., Goleta, Calif. 93117.

Digilog, Inc. has announced its Network Diagnostic and Test System (NDTS) that overlays existing networks, uses an IBM Personal Computer as the system controller and accesses RS-232C and V.35 interfaced circuits. Up to 354 links can be monitored.

The operator has control for monitoring fault alarms and network status, testing system circuits and performing A/B switching from the Personal Computer console. NDTS uses a data base that identifies circuits and equipment with user-defined names. NDTS also provides a series of test buses and a test equipment access matrix.

It costs between \$400 and \$500 per line for digital only; between \$700 and \$800 per line for digital and analog, depending upon options.

Digilog, 1370 Welsh Road, Montgomeryville, Pa. 18936.

Communication Networks International has introduced a communications system that includes an intelligent storage buffer, an autodial AT&T 213-type modem, a printer and a CRT.

QWK Messenger reportedly is intended for applications such as electronic mail store and forward and credit reporting. Messages are stored and edited off-line and transmitted via the modem. The system has a standard 16K bytes of random-access memory (RAM) but is available in customized versions with varied types of RAM, read-only memory (ROM) and electrically programmable ROM. Message format, prompting and handshaking protocols can also be customized for applications.

QWK Messenger is available now and costs \$2,900.

Communication Networks International, 2829 N. 44th St., Phoenix, Ariz. 85018.

Precision Systems has announced a communications protocol handler for retail automation applications. Called the PAC, the device contains firmware that supports the protocols used by most popular electronic cash registers and point-of-sale devices. Commands from the computer select the appropriate protocol and handle the data exchange.

The PAC hardware connects to a host and the terminal devices via RS-232 interface. The connection can be locally hardwired or be made over phone lines via a modem at speeds from 300 to 9.6K bit/sec.

The PAC handles the entire overhead of both the host and cash register protocols. This includes initializing the communications operation, commencing data transfer, polling, performing error recovery and cur-

rection, pausing where appropriate and disconnecting the communications link as governed by the rules of the protocol. One PAC costs \$5,400.

Precision Systems, 223 Crescent St., Waltham, Mass. 02154.

Viasyn Corp., formerly known as Comshare Systems Corp., has announced networking boards designed to provide its System 816 and Comshare 10 Plus minicomputers with mainframe communications capabilities.

The NET 101 was designed for use with Viasyn's System 816 and the NET 11 for use with Viasyn's Comshare 10 Plus. They reportedly let software developers communicate with mainframes using Synchronous Data Link Control, High-Level Data Link Control, bi-synchronous and asynchronous protocols.

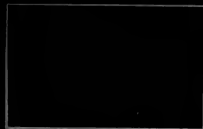
The products are said to support Datapoint Corp.'s Arcnet protocol under Digital Research, Inc.'s DRNET and require a passive hub and BNC coaxial cable to network up to four nodes to a mainframe. According to the vendor, other microcomputers that support Arcnet can be integrated into the network.

The boards use Intel Corp.'s Multi-Protocol Serial Controller and feature asynchronous communications up to 50K bit/sec and bit- and byte-synchronous communications up to 800K bit/sec.

Scheduled for shipment in February, the boards cost \$595 each.

Viasyn, 3505 Breakwater Court, Hayward, Calif. 94545.

THE MADZAR Z112A



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	IBM	5152	36	494
DAISY WHEEL				CHARACTERS PER SECOND
	C. ITOH	A10-20S	29	\$ 699
	OLIME	LP20	20	799
	NEC	2010	20	950
	DIABLO	620	20	995
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SYSTEMS & PERIPHERALS

DEC offers packaged Vaxclusters

By Donna Raimondi
CW Staff

MAYNARD, Mass. — Digital Equipment Corp. has released its first packaged Vaxcluster System configurations, the VAX-11/750 Minicluster and a dual VAX-11/785-based Vaxcluster. The systems run under DEC's VMS operating system.

The VAX-11/750 Minicluster — which sells for \$215,530 — consists of two VAX-11/750 processors, each with 4M bytes of main memory, a four-node star coupler, a DEC RSC-50 hierarchical storage controller subsystem, computer-interconnect interfaces and 70M bit/sec buses. The con-

figuration is targeted toward users who want to separate applications on different central processors. The price is \$10,000 less than the same system parts bought separately, the vendor said.

The dual VAX-11/785 configuration — priced at \$506,000 — consists of two central processors, each with 8M bytes of memory and a floating-point accelerator, an eight-node star coupler, RSC-50 storage controller subsystem, computer-interconnect interfaces and 70M bit/sec buses. This configuration is said to deliver 3.4 times the performance of the VAX-11/780 and was designed for users who need extensive

system availability and data sharing in a high-performance computing environment. The price reportedly is \$70,000 less than the same parts bought separately.

One of the features of the clustered systems is that if one processor fails or has to be shut down for some reason, the other processors will continue to operate, the vendor said. Users may add any VAX-11/750, 11/780, 11/785 or other Vaxcluster elements, including the 8600 central processor, to either of the announced systems as needed.

More information can be obtained from DEC, Maynard, Mass. 01754.

■ First Computer Corp. unveiled a 22-bit multibus microcomputer called the Spirit 68/80

■ Raster Technologies, Inc. enhanced its Model One/80 graphics terminals with a video output capability/81

INSIDE

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DG unveils graphics system for high-end Eclipse

WESTBORO, Mass. — Data General Corp. has announced the GW/10000 SX graphics cluster system, based on its high-end Eclipse 10000 SX superminicomputer that was released recently (CW, Feb. 4). The company has also introduced the GDC/2400 graphics display controller and a display for its GDC/1000 and GDC/2400 graphics controllers.

Users of the GW/10000 SX graphics cluster system may select from DG's AOS/VS, AOS/RT32, DG/UX or MV/UX operating systems.

The system costs \$283,300 for a typical

configuration that includes a 354M-byte disk and dual-mode tape drive.

The graphics system is said to include more than 130 graphics commands. Two display monitors allow users to simultaneously view graphics outputs as well as alphanumeric data and instructions. The alphanumeric data and instructions. The unit is available with up to 32M bytes of memory and supports up to four users simultaneously.

The GDC/2400 graphics display controller has four 15-in. pinned-circuit boards — one to control graphics processing and video timing generation, the others

to manage video output and memory. Its 24 bit/pixel capability is said to allow simultaneous display of 1.3 million colors from a total palette of 16.7 million colors. The unit costs \$44,000.

The company also announced a noninterlaced 60Hz option for its 1,280- by 1,024-pixel GDC/1000 and GDC/2400 graphics display controllers. The monitor is said to produce a flicker-free image. The unit costs \$6,500.

More information can be obtained from DG, 4400 Computer Drive, Westboro, Mass. 01581.

DPS 6/22 mini from Honeywell hits marketplace

WALTHAM, Mass. — Honeywell, Inc. has introduced an entry-level multiuser minicomputer, the DPS 6/22, which was designed for small business, departmental or branch office systems.

The DPS 6/22 runs under Honeywell's GOS 6/MOD 400 operating system and can communicate with other systems as part of Honeywell's Distributed Systems Architecture or IBM's Systems Network Architecture.

The unit's central processor is suggested with a Commercial Instruction Processor, which is said to increase the throughput of Cobol programs by executing instructions in firmware rather than software routines, the vendor said.

A Scientific Instruction Processor is said to enhance Fortran, Basic and Pascal performance and to extend performance of Honeywell's Infocalc electronic spreadsheet package.

The main memory capacity of the DPS 6/22 is 1.75M bytes and the unit comes with a five-port workstation controller. Up to two 512K-byte memory expansion boards and a 256K-byte memory board can be added. Additional options include a second five-port controller and a two-slot chassis extender.

The price of the DPS 6/22 basic unit with a 40M-byte hard-disk subsystem is \$17,000. The unit with a 28M-byte fixed disk costs \$12,995.

More information is available from Honeywell, 200 Smith St., Waltham, Mass. 02154.

IBM users face field-upgrade dilemma



Makers of IBM-compatible mainframes and peripherals are going to be pushing the field-upgradable features of their products as a result of recent IBM product announcements that limit users' field migration paths.

This month, IBM has unveiled two high-end products, the 3380 Extended Capability disk drives and the 3090 Model 200 and 400 mainframes, that incorporate technological changes that prohibit current IBM users from field upgrading to the new announced devices. IBM's 3380 Extended Capability disk drives, for example, can be used on the same controller as the older versions, but users cannot mix new and old drives on the same string. Buyers of

3090 mainframes will maintain IBM system software compatibility but will not be able to upgrade current 3080 series processors to the newly announced mainframes.

The makers of IBM-compatible mainframes and peripherals are clearly viewing these recent IBM products as weak links in what, for the past two or three years, has been an almost unbreakable chain of IBM products.

Companies like National Advanced Systems Corp. (NAS), Amdahl Corp. and Storage Technology Corp. (STC) freely admit that they plan a big push to emphasize the field-upgradable capabilities of their products, as opposed to the box-swapping strategy used by IBM.

Will this purported tactic work? It may not rebuild the IBM-compatible business to its once mighty state, but it clearly offers the potential of improving it.

See IBM page 82

Harris adds file server, control unit to repertoire

NEW YORK — Harris Corp. has introduced the 9300 file server that ties together microcomputers and mainframe terminals in an integrated work group.

The company also released the Lanter Concept 6000 control unit that ties together up to 28 Lanter workstations and the Concept 4000 control unit that supports up to six Lanter workstations. Two workstations were also introduced.

The Harris 9300 system, running under Harris' Network Operating System, functions as a file server, a network integrator for distributed data processing and a communications gateway to mainframe computers.

The 9300 system is compatible with the Harris local-area network, the vendor said. Work group mem-

bers can share information, files and system resources, including hard-disk storage, printers and other peripherals.

Work groups of up to 16 IBM Personal Computers, Harris Personal Computer workstations or IBM 3270-type terminals can be connected via coaxial bus access using token-passing (IEEE 802.4-compatible) technology. Harris provides a network interface card to connect personal computers to the bus.

A sample configuration, including a 9300 processor with 1M byte of main memory, 37M bytes of virtual-address storage and hardware connections to the Harris local-area net is approximately \$11,000.

See Harris page 82

SYSTEMS & PERIPHERALS

PROCESSORS

■ First Computer Corp. has introduced its Spirit 88 32-bit microcomputer that runs under AT&T's Unix System V.

Spirit 88 — the third model in the Spirit series — supports up to 12 users and addresses up to 4M bytes of parity MDS memory. The basic system contains 40M bytes of on-line disk storage, comprised of a 20M-byte removable disk cartridge for data file and software transportability, plus 20M bytes of fixed storage.

The system comes in two styles: a chamber pedestal cabinet and a standard rack-mountable unit. Both styles accommodate three models of field-installable expansion modules, increasing disk storage with 40M bytes of fixed/removable storage and either 72M bytes or 142M bytes of fixed storage.

Prices range from \$16,200 to \$19,500, with quantity discounts available.

First Computer, 645 Blackhawk Drive, Westmont, Ill. 60558.

■ Symbolics, Inc. has announced the 3640-1711 processor — an addition to its 3640 processor line — and an 8M-byte add-in memory board for the processor. The company has also announced price cuts for two of its products.

The 3640-1711 processor is equipped with two 140M-byte, 514-in. Winchester disk drives and is priced at \$71,800.

The 8M-byte add-in memory board, Model MEM2, uses 256K-bit random-access memory chips and has been designed for large-system users of symbolic processing. It is priced at \$35,000.

The company has cut the price of its 3640-1611 processor with one 140M-byte disk from \$69,000 to \$55,900. The price of Symbolics' MEM1 2M-byte add-in memory board has been reduced from \$11,000 to \$9,900.

Symbolics, 11 Cambridge Center, Cambridge, Mass. 02142.

TERMINALS

■ AW Computer Systems, Inc. — in an agreement with IBM — has introduced a point-of-sale (POS) reporting system for retail applications. The AW software and communications hardware bridges NCR Corp. POS cash registers to IBM's Personal Computer AT under Venturcon, Inc.'s Venix operating system.

Features include price look-up, credit/debit card authorization, in-store cash audit and in-store department/class totals. Expanded back-office capabilities, including price mark-downs, inventory control and electronic mail, are optional.

Prices depend upon configuration and user needs. In a 100- to 200-store environment, hardware and software may cost between \$15,000 and \$18,000 per store.

AW Computer Systems, 9000A Commerce Pkwy., Mount Laurel, N.J. 08054.

■ Ann Arbor Terminals, Inc. has introduced the user-definable Genie XL terminal with a 60 Ascii charac-

ter set and Digital Equipment Corp. private-use (non-Ascii) features that is said to permit use with standard DEC VT100/52 software.

The Genie XL display ranges from 18 to 30 lines by 80 characters on a nonglare amber screen. The terminal has multiple page and windowing capabilities and can create forms with protect, guard, numeric, justify and security areas, according to the vendor.

The Genie XL has two independent cursors that reportedly allow complete control of cursor location while the host writes in another area of the screen.

Features include slow scrolling and a zoom mode. It has a 15-in. diagonal display and incorporates an integrated tilt/swivel mechanism.

Price of the unit is \$1,395. Ann Arbor Terminals, 6175 Jack-

son Road, Ann Arbor, Mich. 48103.

■ General Business Technology, Inc. (GBT) has released a display station, featuring a 14-in. screen and IBM 5391 terminal compatibility, for the IBM System/34, 36 and 38.

GBT 7700 features include zoom control, scrolling, multidirectional cursor control and light pen function. Options include a three-button mouse for \$150 and individual plug-in printer controller modules, which support GBT letter-quality dot matrix and laser printers, for \$675.

The price of a single GBT 7700 unit, which will be available in the second quarter of 1985, is \$1,650.

General Business Technology, 1891 McGaw Ave., Irvine, Calif. 92714.

■ Davox Corp. has announced two controller systems — the Series 5000 and the Series 3000 — which allow access from Davox workstations to host computers.

The Series 5000 dual-host controller system is IBM 3274-compatible and reportedly permits a user at any Davox workstation to switch communication paths logically from one IBM mainframe to another in any combination of 3270 Systems Network Architecture or Binary Synchronous protocols at speeds to 56K byte/sec.

The Series 3000 asynchronous controller is said to establish an asynchronous communications path from the workstation to an asynchronous host through Davox's 3270 local-area network at speeds up to 19.2K byte/sec. The 3000 has eight ports and connects directly to a Davox System Controller. Additional



Because database software, like a series of freight cars, adds weight. The more you add—inquiry requests, applications, additional data—the more demands you place on the engine. Total system attention is sacrificed. Britton Las adds database software and its own engine, to pull more capacity at greater speeds.

SYSTEMS & PERIPHERALS

3000 controllers can be daisy-chained or connected to a master or expansion controller to provide up to 32 asynchronous ports.

The Series 5000 dual-host controller system, available in May, costs \$11,220; a version with an optional RS-232C to V.35 adapter for high-speed communications costs \$12,215. The Series 3000 asynchronous controller, available in June, costs \$2,295.

Danvers, Four Federal St., Billerica, Mass. 01821.

■ Atlantic Research Corp. has introduced its Xpert Packet Terminal System, which was designed for X.25 networks; an option to its data recorder that allows the recorder to be left unattended to monitor digital communication lines; and a CRT-

controlled fallback switch system.

An Xpert terminal can interact with up to four different host systems at the same time. It emulates IBM's 3270, Digital Equipment Corp.'s VT100, graphics and Acl devices while attaching directly to an X.25 network. The X.25 and terminal emulation functions reside in the terminal.

The Interview 20R Data Recorder with the "unattended remote" option is said to address the problem of repeat service calls for erratic problems on digital communications lines. The option allows the Interview 20R Data Recorder unit to be left unattended at a remote site and accessed through a dial-up modem, thereby freeing a technician to proceed to the next service call. When used with Atlantic's Network Test System, the Interview 20R Data Recorder may ac-

cess any remote circuit.

The CRT-controlled fallback switch system for data communications networks allows the user to reconfigure up to 1,500 circuits per site with both local and remote control. The system is a step between Atlantic's manual patch/switch systems and fully automated Network Test Systems. Typical applications include local or remote front-end switching or modem substitution.

The price of the Xpert Packet Terminal System is \$2,995, and the remote option for the Interview 20R is priced at \$500. The CRT-controlled fallback switch system costs \$5,000 for a configuration of 100 circuits, with prices varying depending upon the number of circuits and the equipment already in place.

Atlantic Research, 3300 Cherokee Ave., Alexandria, Va. 22314.

Why Britton Lee's relational database software comes with its own hardware.

Relational database management systems provide the outstanding tool for easy-to-use, high-level inquiries, for fast applications development, and for creation of an information resource for improved productivity.

Unfortunately, a software-only DBMS running on a host extracts a performance penalty.

The heavy CPU demands and storage requirements can reduce general purpose mainframes (and all the applications running on them) to a crawl. Britton Lee offers this economical, proven alternative:

The Intelligent Database Machine™ Superior speed and capacity.

The Intelligent Database Machine (IDM) is the integration of relational database software with a specialized hardware processing and storage environment.

The resulting system delivers virtually instant execution of database operations.

The host systems are freed from database chores.

Meanwhile, the Britton Lee IDM processes inquiries and delivers responses in a fraction of the time associated with conventional software-only systems.

And this performance is delivered at a fraction of the cost of adding mainframe computing resources.

There's more. You get a common source of data in a multi-computer environment.

The IDM was designed to allow a huge variety of computers—micro, mini, and mainframe—to communicate with the IDM and share access to a common pool of data.

Your DEC VAX™, AT&T 3B20, IBM 303X and other mainframes, and a wide variety of personal computers can be attached. The IDM was designed to support hundreds of users on different systems, accept and respond to hundreds of inquiries in seconds, and manage a pool of information as large as 10 gigabytes.

As a result, you can turn your multi-computer environment into a manageable information

network. And working with a common pool of managed data minimizes misinformation and increases productivity.

Britton Lee invented the Intelligent Database Machine.

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To find out how you can benefit from the Britton Lee solution, please contact Chris Merritt at (408) 378-7000.

Britton Lee, Inc.
14400 Winchester Blvd.
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Britton Lee, Inc.
The Intelligent Database Solution.



GRAPHICS SYSTEMS

■ Raster Technology, Inc. has enhanced its Model One/80 color composite graphics system with a Genlock generator-locking option card and a multiheaded configuration.

The Genlock option provides video output that is compatible with the American National Television Standard Code (NTSC) and the European Phase Alternator Line/Système Electronique Couleur Avec Memoire (PAL/Secam) standards and allows the Model One/80 to be locked to a master synchronization source.

The option is available on the Model One/80 for \$2,500 for the NTSC version and \$3,000 for the PAL/Secam version. A dual-headed configuration of the Model One/80 costs \$27,100 for the system alone or \$36,500 packaged with two monitors, a keyboard, libraries and drivers. A tri-headed system costs \$36,400 alone or \$47,900 packaged.

Raster Technology, 8 Executive Park Drive, N. Billerica, Mass. 01862.

OFFICE SYSTEMS

■ Syntex, Inc. has added the Virgo electronic file server and the Leo workstation to its line of office automation products.

The Virgo file server accommodates up to 12 users and stores more than 28,000 pages of shared information. Available in 10M-, 30M- or 60M-byte versions, it connects to both Syntex and IBM microcomputers.

The Leo workstation can be configured with either the DIN standard keyboard or an electronic typewriter. It supports multitasking concurrent tasking.

Both systems support a range of data communications capabilities, including IBM, Digital Equipment Corp. and Hewlett-Packard Co. terminal emulations.

Virgo prices start at \$6,500, and Leo is priced at \$3,300.

Syntex, P. O. Box 657, 846 Industrial Way W., Easton, N.J. 07724.

POWER SUPPLIES

■ The Precision Materials Group of GTE Products Corp. has added three new Rural Electrification Association-approved surge protection products designed to protect telecommunications equipment from lightning strikes and sustained contact with power lines.

The CABB gas-tube surge arrester was designed for telephone circuit protection. It is Underwriters Laboratories, Inc. (UL)-approved. The CP-506 single-pole station protector features a design that internally grounds the tip-and-ring terminals when the arresters are removed.

The UL-approved indoor/outdoor protector comes with two CABB surge arresters, wiring hardware, and a tamper-resistant cover. The CP-523 universal central office gas-tube protector is a replacement for carbon-air gap discharge blocks.

The CABB is priced at \$1.05/unit, the CP-506 at \$6.24/unit and the CP-523 at \$1.89/unit.

GTE Precision Materials Group, 1000 Sugar St., Teterboro, N.J. 07088.

SYSTEMS & PERIPHERALS

HARRIS

from page 79

The Lanier Concept 6000 control unit is a file-server that can tie together up to 28 Lanier workstations or Concept 4000 control unit. Resources that can be shared using the 6000 include printers, disk drives, data communications services and applications processor attachments.

Software options

Software options include Lanier's line of office automation software, the Library Services archival retrieval service and the Xenix Applications Library written by Lanier and third-party software developers.

The Concept 6000 system is compatible with the Hartman local-area network. A fully configured network — using Concept 6000 and 4000 systems — is said to accommodate more

than 1,000 workstations.

A 6000 processor with 1M byte of main memory and 68M bytes of storage costs approximately \$22,000. The system will be available in April.

Concept 4000 control unit

The Lanier Concept 4000 control unit runs under Harris' H-DOS operating system and supports up to six Lanier workstations, providing access to data base management, file and peripheral resource sharing and word processing.

The Concept 4000 will be available in April. A configuration that includes a processor, 256K bytes of main memory and 10M bytes of storage costs approximately \$6,500.

The Concept 1200 and 1400 workstations were designed for use in a resource-sharing network or in a stand-alone configuration. The 1200 uses a

dual-processor design that allows it to use both 8-bit and 16-bit programs. An Intel Corp. 8088 microprocessor runs the 16-bit Microsoft Corp. MS-DOS operating system, and a Zilog, Inc. Z80-B microprocessor runs Digital Research, Inc.'s CP/M packages.

Aimed at WP, clerical tasks

The Concept 1400 is targeted for intensive word processing tasks and clerical functions. Two microprocessors, an 8086 and a Z80-B, allow use of all Lanier office automation packages. The 1400 can also use the CP/M operating system.

The Concept 1200 costs approximately \$3,200, and the Concept 1400 costs approximately \$4,500. Both workstations will be available in April.

More information is available from Harris, Melbourne, Fla. 32919.

IBM from page 79

The big reason users buy IBM-compatible products is that they offer a significant difference — a faster delivery date, higher performance, reduced floor space requirements or a better price than IBM machines. While all four elements have been available from the IBM-compatible vendors in recent years, IBM has done a much better job of providing those elements as well.

Consequently, the lure of IBM-compatible products has apparently not been strong enough to get IBM users to leave the fold in droves. Or to put it another way, perhaps the IBM-compatible products have not been different enough to attract user attention.

Technological changes

Frequent technological changes by IBM have also made some IBM users leery of straying too far from the IBM flock. But those same technological changes also make it impossible to field upgrade older products. For example, the newly announced 3090 mainframes use emitter-coupled logic circuits, as opposed to the transistor-transistor logic circuits previously used by IBM. Likewise, the newly announced 3380 models have different read/write heads and internal circuit design that prohibit users of older 3380s to upgrade to the newer units.

Remaining on IBM's technological edge can be a rewarding yet expensive proposition. Many users, especially those with rapidly growing demands for computing power, said they feel the benefits of sticking with IBM exceed the cost of buying the latest IBM products. For users who prefer the stability of field upgradability, the IBM-compatible vendors may have hit on an ideal marketing tactic.

Some users whose computing needs are not as volatile as the leading-edge shops resent that IBM seems deliberately to make products obsolete. For them, the promise of continued field upgradability from a third party may clinch the deal.

Can vendors make good on promises?

But can the IBM-compatible vendors make good on their promises of future field upgradability? It may be difficult. Virtually all IBM-compatible vendors admit the days of offering reverse-engineered versions of IBM products are gone. Today's mainframes and peripherals are just too complex to develop look-alikes and still offer viable products in the ever-narrowing window of profitability allowed by IBM.

Instead, companies like Memorex Corp., STC, NAS and Amdahl have been developing products that offer compatibility with IBM's systems but employ a unique architecture. But as IBM changes technologies in its machines to make them faster, more reliable and less expensive to manufacture, it seems reasonable that IBM-compatible vendors' products may be forced to make similar technological changes.

After all, there is a finite number of proven technologies that can be used to improve a product dramatically. As a result, the promise of perpetual field upgradability could wind up being an issue of postponed nonupgradability. For the user, that could translate into pay now or pay later.

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Comax Computer

MICROCOMPUTERS

Topview hits the stores

Some praise multitasking software's features but question strength of demand among users

By Eric Bender
CW Staff

BOCA RATON, Fla. — IBM's Topview operating environment software, described by IBM as its introduction as "a key foundation for future applications," began shipping to computer dealers this month.

Topview integrates Personal Computer applications under a common, multitasking environment that offers menus, windows and other ease-of-use features. The package has remained basically unchanged since its August debut, an IBM spokeswoman said.

The \$149 product will run on most members of the Personal Computer line with at least 256K bytes of random-access memory (RAM). Most observers expect a Personal Computer XT with 512K bytes of RAM to be a useful minimal configuration.

Topview is offered with a 90-day limited warranty, and two compatibility book-

lets for IBM and third-party applications are available. The \$396 Topview Programmer's Tool Kit, meanwhile, was scheduled for delivery in mid-month.

Few users have examined Topview yet, but the early reaction among dealers was largely favorable. "It's slick, it's nicely implemented, it's colorful, and it's inexpensive," said Ralph Wagner, president of Microsource Financial, Inc. in Watertown, Mass.

However, like several microcomputer managers who said they had not yet seen Topview, Wagner said, "It's far from clear at this time" who really needs this type of operating environment. "Is there really a need to have multiple screens open at one time?" he asked.

Two other major microcomputer operating environments besides Topview are scheduled to ship by midyear — the Graphics Environment Manager (GEM)

See TOPVIEW page 57



SMALL TALK
Edward Werner
CW Staff

A tool that's unusually fun

Mind Prober, a personality analysis program for the IBM Personal Computer from Human Edge Software Corp., may be either the hottest application of an expert system for nonexpert users or a parlor game on the order of the Ouija board. After several days of rigorous testing in this newspaper's office, controversy still surrounds its usefulness.

There is no question about one thing, though: It stimulates use of the personal computer. Reporters flocked around the microcomputer to analyze a coworker or

See ANALYZE page 54

■ **Tallgrass Technologies** introduced a series of personal computer storage systems, all featuring a type of cartridge tape drive said to simplify backup operations/B4

■ **Core International** released a line of hard disk drive upgrade kits for the IBM Personal Computer AT, and tomorrow announced a Personal Computer AT version of its Bemouli Box removable-cartridge storage system/B5

MICROBITS/THOMAS MADRON

Statistics needs unmet

Whis-bang graphics are all the rage in the microcomputer marketplace — occasionally with good reason — but graphics is only a display tool, not an end in itself.

Statistics are among the things graphics can display, but there is still a gap between programs that can display statistics and the programs that generate the statistics. Many business statistics packages have only primitive statistical capabilities, while those with strong statistical abilities provide few graphics — and then only character graphics.

But good statistical systems can be important in many business environments, and modern microcomputers are making the concept of a statistics workstation a reality.

In the days when statistics were computed either on a calculator

See STATISTIC page 58

Madron is manager of computer services at North Texas State University in Denton, Texas.

Wang enhances micro

Office Assistant upgrades include increased memory, spelling checker

LOWELL, Mass. — Additional communications capabilities, a spelling checker and a model with 512K bytes of internal memory have all been added to Wang Laboratories, Inc.'s Wang Office Assistant line.

The Wang Office Assistant, a combination word processor, personal computer and typewriter, is based on the Intel Corp. 80186 microprocessor and runs a Wang multitasking operating system.

The 512K-byte Office Assistant reportedly increases to five the number of tasks that users can run simultaneously.

The new model is said to offer a non glare, 15-in. monochrome monitor with a tilt-and-swivel stand, detached keyboard, power supply and one 5-1/4 in. 360K-byte diskette drive. It comes bundled with Wang's WP Plus text editor and format processing capability.

The 30,000-word Spelling Verification program reportedly allows users to create personal dictionaries of up to 300 words

See ADDITIONS page 57

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MICROCOMPUTERS

Disk drive subsystems out for IBM micro

OVERLAND PARK, Kan. — Talgrass Technologies Corp. has introduced a series of hard disk drive subsystems with integral cartridge tape backup for IBM Personal Computers and compatible systems.

The Talgrass 5000 and 6000 series include four models with between 25M bytes and 80M bytes of hard-disk storage, all featuring an integral 80M-byte cartridge tape backup subsystems. The vendor also announced the 4060 model, a 60M-byte tape storage subsystem.

The products incorporate a Personal Computer Tape format developed by Talgrass, the vendor said. This format reportedly allows users to employ commands for both hard disk and tape similar to those of standard PC-DOS. Each tape volume has an individual directory, and system booting can be done directly from the hard disk, the company said.

According to the vendor, the storage systems use ANSI-standard DC-600A or DC-615A 1/4-in. tape. Error correction features can correct up to 4K bytes per 8K-byte block

of data on the tape.

Other storage system features

Other features of the storage systems reportedly include the ability to overwrite the tape without prior erasure and single- and multiple-file backup and restore functions.

The Model 4060 tape system costs \$1,006. The 5025 Hardfile system with 25M bytes of disk storage and the 50M-byte tape drive is priced at \$3,495. The Model 6135 Hardfile with 35M bytes of disk storage and the tape drive costs \$4,495.

The Model 6050 Hardfile with 50M bytes of disk storage and the tape drive is priced at \$5,495. The Model 6150 Hardfile with 80M bytes of disk storage and the tape drive costs \$7,495.

More information on the disk drive subsystems is available from Talgrass Technologies, which is located at 11100 W. 82nd St., Overland Park, Kan. 66214.

ANALYZE from page 83

a friend.

The software asks those under scrutiny their sex and age (over or under 18). It then provides a list of 66 adjectives and asks which apply. The adjectives arise out of the personality evaluation research done by James Johnson, a clinical psychologist and one of the program's three developers.

Applying adjectives

Deciding whether the adjectives applied appeared to be almost as much fun as reading the reports that the software produced.

"Meek? Him? Outragous, maybe; not meek."

"Fun Loving? No question. A party animal."

The Mind Prober personality profile covers such topics as how the subject relates to work, life stress and sexuality. What was more remarkable was that people actually crowded around a personal computer to use it.

True, they were not entering high-level PC-DOS commands or writing programs in Basic. But they were learning how to load a program and execute simple commands in a non-threatening environment.

Not without flaws

Mind Prober, available at \$49.95 from Human Edge Software, Palo Alto, Calif., is not without flaws. Its greatest drawback is that it apparently does not allow users to go back and change their decisions on adjectives. If you say your test subject is "yielding," for example, the label sticks until you start a whole new analysis.

On the whole, though, Mind Prober is the equivalent of a video game for adults. It is the kind of lightweight software that a microcomputer manager might want to turn loose among a group of office workers who are getting their first exposure to personal computing.

But unlike a video game, Mind Prober has a utilitarian value that could have real meaning for an organization. Mind Prober, you see, works.

Not too sophisticated

It does not give as sophisticated an analysis as a clinical psychologist might. In fact, the descriptions sound accurate about 80% of the time, a figure that Human Edge said is approximately consistent with its own testing.

But how often can we say that about our own character judgments, particularly when we make them in five minutes, roughly the average time it takes to do a Mind Prober assessment?

Mind Prober forces us to organize our thinking about another person — remember those 66 adjectives? — and then applies the judgment of experts to its evaluation.

Inevitable assistance

For a sales representative dealing with a recalcitrant prospect, a lawyer facing an unpredictable judge or an executive with a key position to fill, such assistance could be invaluable.

So, say what you will about Mind Prober: It is either untrustworthy or shallow or thought provoking and likable.

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MICROCOMPUTERS

Iomega introduces storage system for AT

ROY, Utah — Iomega Corp. has introduced a version of its Iomega Bernoulli Box for the IBM Personal Computer AT.

The Bernoulli Box reportedly offers 20M bytes of storage on a removable cartridge and can interface with the standard version of the Personal Computer AT.

The product is said to have a data access speed of 36 msec and reportedly can copy a 10M-byte file in 1.72 minutes when attached to the Personal Computer AT running Iomega 2.3 software. Users with the enhanced Personal Computer AT, which comes equipped with a 20M-byte internal hard-disk unit,

can add the 10M-byte Bernoulli Box to their systems.

The 10M-byte Bernoulli Box for the Personal Computer AT is priced at \$2,695; the 20M-byte unit is priced at \$3,695.

Iomega is located at 1821 W. 4000 S., Roy, Utah 84067.

Five AT upgrade kits available

DELAIR BEACH, Fla. — Core International, Inc. has announced a line of hard-disk upgrade kits for the IBM Personal Computer AT. The AT Plus upgrade kits are available in capacities of 30M, 30M, 40M, 50M and 72M bytes. An AT Plus 72 upgrade kit would reportedly provide a standard Personal Computer AT with 512K bytes of dynamic random-access memory and 72M bytes of on-line data and program storage.

Programmable read-only memory chips are included for the 40M-byte to 72M-byte

drives. Optional 160 msec memory chips that boost the 256K-byte memory of the low-end model to 512K bytes are available.

The hard disks are said to feature a data transfer rate of 5M bytes/sec and a rotational speed of 3,600 rpm. Prices for the disk upgrade kit only range from \$1,595 for a 30M-byte capacity to \$6,990 for a 72M-byte capacity. The 512K-byte memory option ranges in price from \$3,090 to \$5,990.

Core International is located at 642 S.E. 5th Ave., Delray Beach, Fla. 33444.

Government security manual out

WASHINGTON, D.C. — The National Bureau of Standards has published a manual designed for managers to use to strengthen personal computer security.

The manual examines the range of physical threats to personal computers, such as theft or fire, and also looks at the risks faced by a system's data.

In addition, methods for providing software integrity, data backup and user accountability are discussed.

The manual, "Security of Personal Computers: A Management Guide," also reportedly offers a plan of action for management and contains references to additional information and security products. A self-audit checklist is included.

The price of the manual is \$3, and it is available from the U.S. Government Printing Office, Washington, D.C. 20402.



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MICROCOMPUTERS

TOPVIEW from page 53

from Digital Research, Inc. of Monterey, Calif., and Microsoft Windows from Microsoft Corp. in Bellevue, Wash. — and these packages also have their champions.

Topview gathering support

But recent interviews confirmed that Topview has gathered the most recruits from the independent software vendors whose support will make or break a standard.

"Everyone in the IBM environment has to be able to run under Topview," said Susan Luster, marketing vice-president at Powerbase Systems, Inc. in New York.

"The only one that's going to make it is Topview," agreed Richard Rabbin, president of Alpha Software Corp. in Burlington, Mass. As a software developer, "you have so many things to worry about with the product," he added. "What will it look like? What will it run on? You don't have time to spend [worrying about] what operating environment is going to work out, so you go with the safest thing."

Other vendors will hold off on customizing their software for a given environment until they see how their customers react. "There's a lot of 'wait and see' in the industry," said Wayne Erickson, president of Microrim, Inc. in Bellevue, Wash.

Harvard Software, Inc. in Littleton, Mass., also intends to wait on the market, Harvard Software President, Richard Wolfson said. "It's not clear what problems [the operating environments] are solving," he said. "If anything happens suddenly, [in the market], I'd be surprised."

The three candidates all promise to make life easier for end users, particularly those with little or no computer expertise. Most important, each will provide a common user interface for all sorts of applications, which could shorten training time and simplify jobs that require moving back and forth between tasks.

All three also will look best on mi-

cro with a lot of memory and computing horsepower. "No one is going to run any of those products in the [personal computer] environment unless they're loaded memory-wise," Erickson said.

Luster predicted that Topview will arrive in force only when the IBM Personal Computer AT is available in high volume. "Running on smaller machines, it doesn't make much sense," she said.

In prototype form, Topview "runs like a dog," commented Harvey Jeanne, vice-president for product development at Ashton-Tate in Culver City, Calif.

Another limitation, unlike the cases for GEM and Windows, is that graphics-oriented packages cannot take advantage of windowing and other features under Topview. This has led to speculation that IBM is

planning a second bit-mapped graphics version, noted Chris Christiansen of the Yankee Group in Boston. "I think Topview 1.0 will be obsolete by the end of the year."

Differences in timing

Another crucial difference between environments is that Topview and Windows will be multitasking, but the first version of GEM will not. GEM is scheduled for late-February delivery, and a GEM seminar was expected to draw about 60 developers and 20 OEMs this month, according to Digital Research.

GEM's biggest advantage for users is its Apple Computer, Inc. Macintosh-like user interface, said Peter Flinn, executive vice-president of Lifetime Software, Inc. in Monterey, Calif. Lifetime is adapting its Volkswriter Deluxe word processing pro-

gram for GEM and expects to deliver a version by the second quarter.

"Not everyone wants to type in commands," Flinn said. Among Lifetime's corporate customers, a certain number of users are asking for Macintoshes, "but the corporation doesn't want to support another machine," he said. GEM provides a low-cost answer, and while the Personal Computer will not run at blinding speed, "it's powerful enough," he added.

The third contender, Microsoft Windows, boasts its family ties to the standard PC-DOS and MS-DOS operating systems, and Windows still gets considerable support, although it holds down the longevity record for micro vapors.

Announced in November 1983, Windows is now scheduled to ship this summer.

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MICROCOMPUTERS

STATISTIC from page 83

tor or on a mainframe, it was often time-consuming and arduous to produce significant analyses. The arrival of relatively friendly and powerful mainframe statistical packages improved the ability to do studies with significant statistics. However, even today in many installations, only the systems programming staff knows about the uses of packages like SAS Institute, Inc.'s Statistical Analysis System (SAS) or SPSS, Inc.'s Statistical Package for the Social Sciences (SPSS).

Both SAS and SPSS, along with several other widely used mainframe software systems, were first developed for mainframe computers. The advent of the Intel Corp. 8086 and other 16-bit microprocessors made it possible for the mainframe programs

to be ported to desktop machines. In addition, packages written originally for micros are appearing with greater frequency.

In a computing center, statistics frequently are used for analyzing and evaluating computer performance data. Some data is best analyzed on the mainframe systems it was collected for, simply because of the volume — for example, the various systems available for reducing performance data from IBM's Systems Measurement Facility to understandable terms.

Detailed analysis suited to micros

Even with mainframe systems available, however, it is sometimes useful to take a subset of the data and do further detailed analysis and to produce graphics for presentation. Here the micro-based statistical pro-

grams, along with appropriate graphics packages, can be helpful after the data is downloaded to the micro.

Market analysis, personnel studies, various forms of operations research and related activities are much easier to accomplish on a desktop computer than on a mainframe system. If a micro is equipped with a hard disk drive, micro-based systems can perform impressively and can handle a relatively large data set. Survey analysis, in particular, can be handled easily and in a straightforward manner not previously possible.

In many large organizations, data entry groups are now using micro-based workstations to capture data that was once obtained with traditional keypunch or key-to-disk systems. Often it is possible for a researcher to obtain a data set without

ever going close to a mainframe system.

The good statistical package

What should we look for in a good statistical package?

In the micro world, as with mainframes, more time is often spent putting the data in some reasonable order than in analyzing the data. Good data management facilities are a must in a decent statistical package.

The data management facilities should include the ability to import and export data into and out of the system in a wide variety of formats, including "flat" or rectangular files with specified and variable formats, files formatted in Software Arts, Inc.'s Data Interchange Format and as many others as possible.

We should be able to take data files from Lotus Development Corp.'s 1-2-3 or a mainframe or other source and read them with some ease. Likewise, when the analysis is finished, we should be able to export the results to other programs for graphics presentations or other forms of analysis. Currently, no one program will satisfy all our analysis needs.

In addition to importing and exporting data with ease, we should also be able to manipulate the data to create new or altered variables, such as fields or values, by combining several values, by recoding or rearranging the numbers for a specific variable and by transforming the data. These operations should be made as easy as possible.

Other data management capabilities

Other data management capabilities might include sorting, deleting fields or records, adding fields or records, rank ordering the data, aggregating data according to some specified criterion and leading and lagging the data for some types of time-series analysis.

The statistics provided should include univariate and multivariate statistics as well as various forms of inferential statistics. For forecasting purposes — an important element in many business situations — a rich variety of time-series statistics will be valuable. One of the primary deficiencies in many micro-based statistical packages is the lack of adequate multivariate statistics functions ranging from multiple regression to far more esoteric procedures.

Finally, the documentation should be adequate or the package should be sufficiently friendly to use without printed documentation. The printed documentation should include not only explicit descriptions of how to use each and every procedure, but also a technical appendix with the mathematical algorithms used in calculations.

WHY WAIT A YEAR FOR THE VAX 8600?

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COMPUTER INDUSTRY

Firm tightens belt, looks ahead

Computer Devices exec shifts firm's course

NUTTING LAKE, Mass. — Robert J. Moore, president, chairman and chief executive officer of Computer Devices, Inc., kicked himself out of his office last year because he thought a newly hired marketing executive needed it more than he did.

Moore moved his office to a chilly conference room — the building's heating system is faulty — where he now directs efforts to guide the company through a Chapter 11 bankruptcy reorganization. Because the building's heating system is faulty, Moore and his secretary, on a recent cold winter morning, took turns sharing a portable electric heater that they placed by their desks.

Computer Devices has been a no-frills operation since it scurried for protection under the Federal Bankruptcy Act in October 1983, its losses mounting from an untimely and ill-conceived entry into the IBM Personal Computer-compatible market.



Moore

The Dot, the personal computer introduced by the company in 1982, used a 3 1/2-in. disk, which made it incompatible with IBM's 5 1/4-in. disk.

Moore, a former executive at IBM, Xerox Corp. and Bunker Ramo Corp., came to Computer Devices from Babson College in Babson Park, Mass., where he had been acting dean of the school of management education. In mid-1983, he said, some of

See MOORE page 102

Firm succeeds by seeking out non-IBM areas

By Charles Redwood
CIVIL RIGHTS BUREAU

NEW YORK — "Don't do what you know IBM will do," said Stanley Adelman, president of a small software and consulting firm here, in explaining his company's path to success.

Since 1976, Adelman's company, Systems Strategies, Inc., has exploited niche markets that IBM and other large manufacturers ignored. New Systems Strategies is prospering by duplicating what IBM does but doing it for other vendors.

Adelman's firm has specialized in supplying corporations and vendors with communications packages that allow them to connect their non-IBM terminals, computers and other devices to IBM's Systems Network Architecture (SNA). Manufacturers who thought they had been shut out are finding that they, too, can be painted blue.

Having only a handful of competitors with similar expertise, Systems Strategies has grown from an initial \$10,000 investment to \$10.6 million in annual sales. It was acquired Dec. 26 by AGS Computers, Inc., a Mountaineer, N.J., software company with \$225 million in annual revenue.

"My partner [Franklin P. Silver] and I cashed in very favorably," said the deliberately unburied Adelman. Now he finds himself being encouraged by AGS to develop new products and continue Systems Strategies' rapid growth.

"TAGS" approach is very entrepreneurial. We are supposed to have completely independent management," he said.

Customers include Gould, Inc., Siemens AG, NEC Corp. and AT&T Information Systems.

In a typical request, Marlboro, Mass.-based Sequoia Systems, Inc. wanted to make its transaction processing computers appear as remote terminals to mainframes and related devices in an SNA environment.

Among other things, Strategic Systems offers the following:

See A&E page 100

Disk pact OK'd

Merger of Dysan, Xidex begets biggest storage firm

By Kathleen Burton
CIVIL RIGHTS BUREAU

SANTA CLARA, Calif. — Shareholders of Dysan Corp., which boasts a 30% share of the hard disk market, and Xidex Corp., the nation's No. 2 floppy disk maker located in Mountain View, Calif., recently approved the merger of the two companies.

The union, valued at approximately \$250 million, makes the resulting company, Xidex Corp., the largest data storage products manufacturer in the world and the second largest floppy disk maker (behind Verbatim Corp. of Sunnyvale, Calif.), said Gary B. Piller, a Xidex executive vice-president, and one of three men who will make up Xidex' "office of the president" management team. Other members of Xidex' presidential staff will be Bert L. Zacher.

See XIDEX page 100



INDUSTRY INSIGHT
Power Briefs
On Other Issues

DEC micro moves continue to puzzle

"Yes we did." "No, we didn't." "Well, we did and we didn't."

So continues Digital Equipment Corp.'s quixotic journey through the dusty plains of the low-end microcomputer business.

Within the space of a few days, DEC conceded it had halted production of its Rainbow micro and would revamp its production lines for new products. Then DEC turned around and objected to char-

See DEC page 98

Contempt charges in Mitsubishi-Leading Edge case settled

By Dennis Redwood
CIVIL RIGHTS BUREAU

BOSTON — Leading Edge Products, Inc. and its supplier, Mitsubishi Electronics America, Inc., recently settled contempt charges brought against Mitsubishi in January by U.S. District Court Judge Robert Keeton.

The contempt action was lodged during proceedings in a suit filed last year against Mitsubishi in which Leading Edge claimed the California-based subsidiary of the Japanese company was damaging Leading Edge by trying to cut off its supply of components. Judge Keeton had ordered Mitsubishi to continue supplying Leading Edge pending a full trial and in January ruled that Mitsubishi had violated his order.

In its suit, Leading Edge contended

that Mitsubishi wanted to break the contract with Leading Edge so that it can market its equipment in the U.S. under its own name.

"We have reached an interim agreement that provides for a consistent supply of products," Bill Sellars, a Leading Edge spokesman, said. As part of the settlement, which did not resolve the original lawsuit, Mitsubishi has reduced its prices in Leading Edge by 15%, a published report said. Neither company would comment on details of the settlement.

Mitsubishi had been ordered by Judge Keeton to show cause why it should not be found in contempt of court and be subjected to appropriate civil sanctions on several grounds, according to a Show Cause Order dated January 10. The order stated the

following:

■ That Mitsubishi failed to deliver products to Leading Edge in compliance with the federal court's December temporary restraining order.

■ That the supplier, at a January 1985 hearing, misrepresented to the court its expectations with respect to deliveries of products in 1985.

■ That Mitsubishi violated contractual obligations by tendering to Leading Edge products that representatives of Mitsubishi knew were substantially incomplete because they lacked monochrome controllers and memory expansion boards.

■ That the supplier willfully misled the court and Leading Edge at the January hearing by stating that it would tender products to Leading Edge in January, when in fact repre-

sentatives of Mitsubishi knew that the products would be substantially incomplete.

The \$360 million lawsuit that Leading Edge has filed against Mitsubishi is still pending, a Leading Edge spokesman said. Under Massachusetts law, if Leading Edge wins the lawsuit, it is entitled to treble damages, or \$1.08 billion, the spokesman said.

The Mitsubishi suit filed in California is also ongoing, said Ric Pochman, executive vice-president at Mitsubishi.

That suit is said to seek termination of the agreement between the two companies.

In the meantime, Pochman said, "We're doing business on an ad hoc basis."

■ Columbia Data Products, Inc. recently announced an executive reorganization and said it is negotiating to convert some of its debt to equity/83

■ Rapid changes in the market for microcomputer storage media caused Tandem Corp. to write down inventory and take a \$15.3 million loss for the quarter just ended/84

■ Despite a continuing legal battle, Paradyne Corp. reported an \$11 million profit for 1984/88



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Information Systems

Macs, Apple come to terms on trademark

VALLEY Forge, Pa. — Management and Computer Services, Inc. (Macs) and Apple Computer, Inc. recently announced they have agreed to settle a suit filed by Macs last September disputing Apple's use of the Macs acronym for its Macintosh personal computer.

Macs, a division of Pentamont Enterprises, Inc., asserted it had used the trademark and service mark "Macs" since 1966 and began in 1969 to use the acronym as part of the product names of several of its software products. The company, based here, produces quality-assurance and productivity tools for use on mainframes as well as Apple and IBM microcomputers.

Under the terms of the settlement, Macs and Pentamont received an undisclosed sum of money from Apple and agreed to discontinue the litigation without prejudice. The settlement provides that Apple may use the trademark "MAC" or "Mac," standing alone or as a prefix on computer hardware manufactured or marketed by Apple and that it may use those trademarks combined with at least two following letters on software. To refer to more than one Macintosh, Apple must add an apostrophe and the letter "s" to form the plural Mac's. Management and Computer Services will continue to use Macs as a suffix on its products, such as Paintmax.

Columbia picks chief executive

COLUMBIA, Md. — Columbia Data Products, Inc. recently announced that the chairman of its executive committee has been named chief executive officer and that the company has initiated discussions about converting a portion of its debt to equity.

The company announced that Samuel Irwin, former chairman of Syntex, Inc., was named CEO, replacing Robert Cross who remains as president of the IBM-compatible micro-computer manufacturer.

Irwin said Columbia began discussions with its suppliers and commercial banks about a recapitalization plan that would include providing debtors with equity in exchange for a portion of its indebtedness. Irwin said the company has also talked to potential investors about raising additional funds for working capital purposes. He also said the company has abandoned plans to sell its manufacturing operations to Evergreen Technologies, Inc., a plan that would have resulted in Evergreen assuming Columbia's manufacturing liabilities, including cash owed to Columbia's suppliers.

The company said that William Dixon, chairman of the board, had assumed primary responsibility for marketing efforts as vice-president of marketing.

Victor to transport operations overseas

By Kathleen Sullivan
CW West Coast Bureau

SCOTT VALLEY, Calif. — Victor Technologies, Inc., which recently emerged from bankruptcy after a year of court proceedings, announced it would close its manufacturing facility here and transfer production to the Far East — most likely Japan. The plant closure will affect approximately 110 employees, said Eric Haas, Victor Technologies' newly appointed president and chief executive officer.

Explaining that the firm was moving to "the economic reality of today's economy," Haas said Victor Technologies will phase out production in California over the next six

months. The company has not yet decided on an overseas location for the plant.

To illustrate the nature of the problem, which he described as "an unfortunate fact of life," Haas cited the production costs of one of Victor's products. He said it would cost the company \$1,350 to build the product in the U.S., while the same product could be purchased in Japan for less than half that amount.

Labor not prime consideration

According to Haas, labor costs were not the primary consideration in the firm's decision to relocate offshore, because labor accounted for only \$200 of the product's total price

tag. The cost of parts made up the bulk of the American production figure, totaling \$1,150 out of the \$1,350, he said.

Victor Technologies, now a subsidiary of DataSonic AB, a Swedish software firm, will maintain its corporate headquarters here, Haas said. When asked if the firm would continue new product development in California, Haas said such research will probably continue there but added that the firm "doesn't care where its new products come from." The company, which now sells the Victor 8000 and the transportable Vicki, plans to introduce a number of new computer systems and office products this year.

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COMPUTER INDUSTRY

Fortune up 29% but out \$21.9 million

By Kathleen Sullivan
CW West Coast Bureau

BERMONT, Calif. — Although Perot Systems Corp. recently reported a 29% increase in revenue for 1984 to \$70.1 million, compared with \$54.4 million in 1983, the company also announced that its year-end loss was larger than originally anticipated, reaching \$21.9 million.

For the fourth quarter ending Dec. 31, Fortune reported revenue of \$18 million, a 42% jump over last year's fourth-quarter revenue of \$12.6 million. Fortune's 1984 fourth-quarter losses widened to \$14.9 million, compared with the same period last year when the firm lost \$6.5 million.

James S. Campbell, Fortune's presi-

dent and chief executive officer, said the bulk of the fourth quarter's losses could be attributed to \$13 million in reserves for write-downs of inventory, excess facilities and receivables.

The total loss per share for the year was \$1.02, while the loss per share for the fourth quarter was 70 cents, Campbell said.

Fortune, which sells ATAT Unix-based multiuser microcomputers, has been trying to regain a foothold in the market since 1983, when performance and reliability problems plagued its systems. Although the company said (and analysts agreed) that it has successfully addressed those issues, Fortune's reputation

has suffered.

Faced with financial troubles and a more competitive market in 1984, Fortune undertook a number of measures to strengthen its position. The company reorganized its management team, streamlined its operations and abandoned the retail market, turning to value-added resellers to market its systems.

Campbell predicted that the company, now armed with a conservative financial plan, will turn a profit in 1986. The company plans to increase its revenue by at least 20% in 1986, he said. He noted that the firm has cut its 1986 break-even point in half to \$17 million, from last year's \$34 million.

Tandon loses IBM contract, reports loss

CHATHAM, Calif. — Microcomputer disk drive manufacturer Tandon Corp., which recently announced the early termination of a contract to supply IBM, reported a first-quarter loss of \$15.3 million, or 30 cents per share, compared with year-earlier profits of \$9.3 million, or 18 cents per share. Revenue for the quarter was \$90.8 million, down from \$95 million a year earlier.

Tandon announced recently that its largest customer, known to be IBM, which accounted for 58% of 1984 sales, had discontinued purchases of full-height, 5¼-in. flexible disk drives. It also announced unspecified commitments by that customer to purchase new products.

The company said shipments of the newer products have begun, but significant volume shipments will not occur until later in the year, and the remaining quarters of 1985 will be affected by the shift.

The financial results were adversely affected by additional inventory reserves and prior adjustments charged off for the quarter, Tandon said. The company said this was due primarily to reductions in the net realizable value of inventory for the 5¼-in. drives and lower capacity Winchester disk drives "in light of recent events confirming a rapid and broad-based industry trend toward half-height, 5¼-in. flexible disk drives and higher capacity Winchester disk drives."

According to Sirjan Lai Tandon, president of the company, "We were able to maintain a stable operating environment despite the difficulties that currently exist in the peripheral and microcomputer industries. Our operations would have been profitable except for those reserves."

Compaq sees 196% increase

HOUSTON — Compaq Computer Corp. last week announced that revenue for 1984 increased 196% to \$329 million, compared with \$111.2 million in 1983. Profits for the year were \$12.9 million, or 47 cents per share, compared with 1983 profits of \$2.6 million, or 13 cents per share.

During the fourth quarter, Compaq posted revenue of \$112.7 million, compared with \$52.2 million in the same period of 1983. Quarterly profits were \$6.5 million, or 26 cents per share, compared with year-earlier profits of \$3.2 million, or 15 cents per share, not including a \$2.1 million extraordinary item in the 1983 quarter.

The year just ended was only the company's second full year of operations. Rod Canion, president and chief executive officer of Compaq, said the company expected 1985 to be another good year, but that a lower first-quarter revenue is expected because of industry anticipation of a seasonal slowdown.

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COMPUTER INDUSTRY

MCI posts fourth-quarter plunge

WASHINGTON, D.C. — MCI Communications Corp. recently reported sharply reduced profits for the fourth quarter and fiscal year just ended compared with 1983. The company attributed the expected decline to access charges and said strong revenue growth is expected to continue.

For the 12-month reporting period, the company posted profits of \$69.2 million, or 25 cents per share, compared with \$202.9 million, or 89 cents per share, for 1983. Revenue for the year increased 22% to \$1.96 billion, from \$1.62 billion in 1983. The results for the year included a previously reported pretax write-down of \$49.5 million, or 11 cents per share, for telex equipment.

The fourth quarter resulted in profits of \$13.2 million, or 6 cents per share, compared with \$43.5 million, or 19 cents per share, in the fourth quarter of 1983. Revenue increased to \$521.4 mil-

lion for the quarter just ended, compared with \$430.1 million a year earlier.

MCI Chairman William G. McGowan noted that the company had met its forecast of quarter-to-quarter improvement in profitability as high fixed costs continue to be spread over a growing revenue base. In the fourth quarter, MCI's call volume

showed an 11% increase over the previous quarter.

"We expect strong revenue growth to continue with the increasing number of telephone customers who will have the opportunity to select a designated long-distance carrier through the equal-access process during the next two years," McGowan said.

Directories List 32,000 D P Users

Each directory of computer installations lists 14,000 computer users covering the NY Metro Area (NY, NJ & CT), and the Mid-Atlantic States (PA, VA, MD, DC, WV & DE). Each site includes a profile of the hardware installed, (languages, databases, etc.), consultants used, future

plans, applications and DP executives' names, titles, and phone numbers. An index provides quick access to 133 cross references by hardware, software and industry. Price: NY-\$270 and MA-\$295. Call (212) 645-0666. Computer Management Research, Inc. 20 W. Riverside Plaza, NY, NY 10016.

Paradyne profits hit \$11 million

LARGO, Fla. — Paradyne Corp. recently reported 1984 profits of \$11 million, or 49 cents per share, compared with year-earlier profits of \$3.6 million, or 16 cents per share.

Revenue for the year just ended was \$289.9 million, compared with \$208.9 million in 1983.

For the fourth quarter, the company posted profits of \$2.6 million, or 12 cents per share, compared with a year-earlier loss of \$1.7 million, or 8 cents per share. Revenue for the quarter was \$82.6 million, compared with \$55.3 million in the last quarter of 1983.

Robert S. Wiggins, president and chief executive officer, said recent expansion of its marketing and services organization was a major factor in the 1984 revenue increase.

According to Wiggins, "The other primary reason for the increase was the acceptance of the newer company products in the marketplace, especially the MPX modems and DCX multiplexers."

Additionally, Paradyne reported that the continuing defense of a suit brought against it by the Securities and Exchange Commission resulted in payments totaling \$1.1 million to outside counsel during 1984.



COMPUTER INDUSTRY



SUPERSTORIES

VG Systems of Woodland Hills, Calif., said it has entered into a long-term contract with Fujitsu Ltd. of Japan for the joint development of a next-generation computer-aided design and manufacturing (CAD/CAM) system. The multiyear contract extends current ties between the two companies. VG Systems currently supplies its display stations to Fujitsu for integration into its CAD/CAM-based systems.

GTE announced that Judge Harold Greene of the U.S. District Court in Washington, D.C., has conditionally

approved the company's consent decree regarding its acquisition of Southern Pacific Communications Corp. and Southern Pacific Satellite Corp., now called GTE Sprint Communications Corp. and GTE Spacenet.

Delphax Systems announced a joint development agreement with Xerox Corp. to produce a 60 page/min ion deposition printer for worldwide distribution. The terms of the contract have not been disclosed. Xerox recently acquired Canada Development Corp.'s interest in Delphax.

Sperry Corp., Blue Bell, Pa., has signed an agreement with Intermetrics, Inc., Cambridge, Mass., to develop an Ada programming language processor for use with Sperry series

1100 mainframes.

Intermetrics, a large independent supplier of data processing compiler programs, will develop the Sperry 1100 Ada compiler system (1100 ACOS).

Data Securities International, Inc. announced it has reached an agreement with the Association of Data Processing Service Organizations (Adapso) to provide two new software-protection services to Adapso members.

As part of an overall strategy to meet the emerging software-protection needs of the DP industry, the Adapso-sponsored program will grant association members direct access to Data Securities International proprietary deposit and post software-development services.

Waferscale Integration, Inc. (WSI) and Sharp Corp. have signed a multiyear cooperative agreement involving WSI's patented Cmos erasable programmable read-only memory (Eprom) technology.

Under the terms of the agreement, WSI will supply Sharp with its proprietary 2-micron Cmos Eprom technology that Sharp will use to manufacture high-density, high-performance 64K- to 256K-byte Cmos Eprom products.

In return, WSI will obtain product manufacturing capacity for the Cmos Eprom products marketed by WSI and an undisclosed sum of money in royalties.

Priam Corp. announced it released approximately 60 employees, principally in the indirect area. Additionally, the company recently transferred approximately 30 employees to work at Vertex, a peripherals manufacturer.

In November, Priam and Vertex announced a definitive agreement to merge.

Wang Laboratories, Inc. has signed three joint venture agreements with China. The agreements, covering three different locations in the northern, central, and southern regions of China, were finalized at the end of December 1984. The first agreement with the ministry of electronics industry in Beijing establishes a joint venture to produce low-end VS computer products including software development. The second agreement calls for the manufacture of 80,000 units of the Wang Office Assistant in Shanghai over the next five years. The third project includes the assembly of the Wang Professional Computer in Xiamen.

Geac, Inc. has formed, as part of its corporate structure, two new business sections to better serve high-growth markets in the electronics industry: industrial automation systems and information systems. The two sections were established from the company's former electronics systems business section, which addressed the computer systems and computer-integrated industrial automation markets. Divisions within that section have been assigned to the new business sections.

United Telecommunications, Inc. and General Electric Co. have reached agreement on the amount of the final payment by General Electric to United Telecom for Calma Co., received from United Telecom in 1981 for \$100 million, plus a subsequent payment to be made in 1985 dependent upon Calma's cumulative 1981-1984 sales. General Electric has made a final payment of \$80 million, settling all pending litigation related to the amount of the 1985 payment.

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Features

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Design

The ERGO 320 is ergonomically designed and housed in an attractive, compact case with an adjustable monitor and smaller footprint than the DEC VT220. The detached, low-profile keyboard, is shorter than the DEC VT220 keyboard, and has an easy-fit adjustment to provide ease of use for all users.

Graphics

Upgradability. The ERGO 320 can accept an optional

graphics board (8085) which will perform all Plot-3D and RoGis functions. The graphics board, which turns an ERGO 320 into an ERGO 340, can be added to existing ERGO 320s. The small footprint is maintained when adding graphics to an ERGO 320 but must be forfeited when purchasing a VT240. Fast, too. In addition, our graphics offers significant speed advantages over a VT240—as much as seven times faster. (See an actual comparison above.)

Price

Micro-Term prides itself on designing and manufacturing innovative products, with complete simulations and competitive pricing. At a list price of only \$895, the ERGO 320 with all the additional features and upgradability should take the confusion out of your decision.



ERGO 340

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DEC VT240

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COMPUTER INDUSTRY

EXECUTIVE
OUTLOOK

Joseph F. Vigil has been appointed president and member of the board of directors and **Dr. Thomas Thumma** has been named vice-chairman of the board at **Elmat Corp.**

Roger W. Johnson, president and chief executive officer of **Western Digital Corp.**, was elected chairman of the board.

Tres Systems, Inc., a Control Data Corp. company, announced that **David Raffus** has been promoted to the position of president and chief operating officer.

Jim Busby has been elected president of **Datasouth Computer Corp.**

Robert Gohmert has been appointed president of **Wangtek.**

Murray Robinson has been named to the post of senior vice-president, operations at **Alcatel Corp.**

Gerald Kovach has been named senior vice-president of regulatory and public policy at **MCI Communications Corp.**

Lee Margrave Jr. has been appointed to the newly created position of executive vice-president and chief operating officer at **Computer Auto-**

mation, Inc.

Stephen Schmidt has been appointed to vice-president, operations at **Tandem Computers, Inc.**

Jerry Aizer has been appointed vice-president and general manager at the **Consumer Electronics Division** of **Hattori Corp. of America.**

Raymond Sims has been appointed vice-president, finance, administration and chief financial officer at **Relational Technology, Inc.**

Raymond Fosse has been named vice-president of U.S. Telephone, a division of **United Telecom Communications, Inc.**

Jacqueline Parfitt has joined **Intel Corp.** as an executive vice-president and general manager of the company's recently acquired **Gifford Computer Systems, Inc.**

Larry Holmström has been named vice-president and general manager of the newly formed federal systems division at **Data General Corp.**

Jeanne Wehlers has been promoted to vice-president and controller and **Richard Lamb** to the position of treasurer at **Tandem Computers, Inc.**

Christian Heideich has been appointed chief financial officer at **Xebec Corp.**

Frederick Wang has been elected treasurer of **Wang Laboratories, Inc.**

DEC 300 page 50

acertimations that it had abandoned the product — of course, if I had up to a year's inventory sitting on the shelf, I also would object to such characterizations. Finally, the company said that next month it will offer enhancements to the **Rainbow** and other micro products.

Conclusions reached

From such definitive statements, two conclusions naturally present themselves: **DEC** is intent on proving yet again that it isn't the foggiest notion of how the micro market operates; or, the company's public relations arm wanted to show the nation's press that it is quite capable of kicking itself in the shin; or both.

On more than one occasion, **Ken Olsen**, **DEC**'s founder and president, has publicly scorned the retail micro market and low-end computing in general. This despite **DEC**'s since-abandoned goal of gaining a good piece of that market.

At periodic intervals during the past two years, the company has shifted strategies for selling micro products or shifted executives saddled with the responsibility to sell a product to which **Olsen** clearly has no commitment. The company has gone from selling quality to selling quality to selling vertically to ... who knows what next?

Any computer marketing executive with even the slightest bit of savvy certainly should realize by now that you do not kill version one before at least announcing ver-

sion two if you have any hope of selling off inventory at above cost.

Killing the Rainbow

Perhaps next month there will be some type of add-on to make the **Rainbow** compatible with the **IBM** Personal Computer. But unless it is given away free, it is not going to sell new Rainbows. No, for all intents and purposes, **DEC** has effectively killed the **Rainbow**, at least personally.

Certainly the **Microvax II** — when it ever gets to market — will be a different story; it has a guaranteed base of **VAX** owners to sell to.

But between now and then, **DEC**'s latest stumble may reflect problems. A **DEC** competitor, **Data General Corp.**, recently stunned the investment community with the news that it will have difficulty showing any profit increase for the current quarter compared with a year earlier; even **IBM** said the year is off to a very slow start.

Bad news

If **Big Blue** is frowning, the industry is in a depression. This is not good news for an industry that has built up huge inventories while other industries have been rapidly depleting inventories.

Given the downturn, the news that **DEC**'s latest **VAX** is yet to ship and its low-end operations are in disarray may indicate that **DEC** is in for a crunch over the short term.

The No. 2 computer company may show yet again that it is big enough to shake the ground when it takes a tumble.

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COMPUTER INDUSTRY

XIDEX from page 88

carla, who will serve as executive vice-president, and Lester L. Colbert Jr., who will be the company's chairman and president.

As a result of the merger, Dyan's shareholders will receive 8714 shares of Xidex stock for every 100 shares of Dyan stock they own, Filler said.

C. Norman Dion, Dyan Corp.'s founder, will be the largest individual shareholder of Xidex, with 5% or 1.6 million shares of the company's stock. Dion said he turned down Xidex's offer to stay on its board and will take a two-year vacation

from business. Company officials said, however, that William Harry, Dyan's president, will continue with Xidex as vice-president of its hard-disk operations.

The staffs of the two firms combined would have numbered 8,800, Filler said. However, because of a 600-person Dyan layoff last August and subsequent attrition, the surviving company's work force will total only 4,700 employees, he said.

Due to efforts to consolidate duplicate facilities in West Germany, Great Britain and Canada, other layoffs will occur later this year, Zaccaria said.

Zaccaria said Xidex ex-

pects to save \$38 million by these work force reductions and another \$15 million by consolidating facilities. He said Dyan's Santa Clara headquarters would be closed, as well as one million square feet of owned and leased office and manufacturing space here and in other locations.

Savings critical

The savings are critical, Zaccaria said, because the merger brings Dyan's \$65.6 million long-term debt to Xidex, on top of its own \$7.7 million debt. Zaccaria said Xidex has \$28.5 million in current assets, compared with Dyan's \$6.2 million. Earnings for the next two quarters will be affected by the merger, Zaccaria said, but not significantly.

Xidex's future strategy will target floppy disks, hard disks and duplicate micrographics for mainframes, its original business, according

to Zaccaria.

Following the acquisition, Xidex will hold 18% of the \$1.1 billion floppy disk market, 30% of the \$400 million hard disk market and 70% of the \$125-million duplicate microfilm business, Zaccaria said. Xidex plans to maintain its Fremont, Calif., factory to manufacture its own disk products. Dyan's plant here will continue operations, making Dyan floppy disk products under its own name, Zaccaria said.

Filler said Xidex's sales for fiscal year 1986 will reach \$200 million for floppy disks, up approximately 40%; \$135 million in rigid disks, up about 20%; and \$140 million in micrographics, represent-

ing a 5% increase.

Dyan ran into financial difficulties last year after investing in a number of unprofitable seedling companies and after backing a 3½-in. floppy disk format that proved unsuccessful in the marketplace, Filler said.

Xidex currently plans to keep its investment in six of the companies it inherited from the merger, including five million shares of Sengate Technology, Inc., a disk manufacturer in Scotts Valley, Calif.

Additionally, Zaccaria said, the merger will not affect an earlier Dyan agreement to make floppy disks for the Eastman Kodak Co. of Rochester, N.Y.

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AGS from page 95

■ A CSNA/3270 package said to allow a mini or micro system with standard Ascii terminals and printers to emulate an IBM 3274 cluster controller operating in SNA/ Synchronous Data Link Control mode with attached IBM 3278 terminals and 3287 printers.

■ An Applications Program Interface said to allow a program on a mini or micro system to appear as a 3278 remote terminal to a host application on a mainframe.

■ A CRSC/RSB package said to emulate any IBM 2780, 3780 or Risp workstations and protocols. It communicates over a Binary Synchronous Communication network to perform batch file transfer functions emulating remote printers and card equipment.

Each of the packages is written in the C language. Systems Strategies said it was able to produce these products because 90% of the necessary source codes are available in IBM manuals. The remaining 10% must be derived by trial and error, he said.

The 125-employee company has been listed on Inc. magazine's Inc. 500 list of fastest growing small companies for three years in a row and now ranks 463rd.

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THE 8TH NATIONAL COMPUTER CONFERENCE

The Eighth National Computer Conference will be hosted by ARAMCO in Al Khobar, Saudi Arabia, on 17 Muharram 1406H, October 1, 1985. This will be a continuation of seven national computer conferences since 1394H (1974).

The National Computer Conference will be sponsored by ARAMCO as an industrial representative for the first time following successful conferences sponsored by academic representatives in the Kingdom. Never-ending development in computer technology, its effect on managing computer resources and wide-spread computer use in industry suggests the following appropriate theme:

'COMPUTERS IN MANAGEMENT AND INDUSTRY'

1. Computer Management and Utilization
2. Computer Graphics
3. Office Automation
4. Computers in Education
5. Data Security
6. Centralized vs. Distributed Systems
7. Computers and Simulation
8. Computers in Industrial Processes
9. Other (Specify)

The conference will include working sessions on the following key issues:

1. Computer Industry in Saudi Arabia
2. Automation of Industry
3. Computer Literacy and National Concern
4. National Computer Data Communications Requirements

The deadline for receipt of paper topic abstracts (minimum 250 words, maximum 700 words) is March 6, 1985. The notification date for acceptance of abstracts is April 15, 1985. The full text of papers accepted by the selection committee is to be submitted by July 17, 1985. Abstracts and papers should be mailed to the following address:

CHAIRMAN, Paper Selection Committee
8th National Computer Conference
ARAMCO P.O. Box 1748
Dhahran 31311, Saudi Arabia.



(PR - 1 - 85)

COMPUTER INDUSTRY

MOORE from page 89

Computer Devices' board members asked him to join the firm. Moore's mission, as the board members described it, would be to manage the explosive growth the firm believed its newly launched Dot would generate. But the Dot did not make a dent in the burgeoning micro market.

"I started to look into the situation, and I found the Dot," Moore recalled in a recent interview. "It was very apparent to me, because of my own background and work, that the Dot wasn't going to fly." With IBM compatibility starting to become an important factor in the marketplace, Moore believed that the Dot's 386-in. disk drive would be its death knell.

Shortly after its initial personal computer fiasco, the company unveiled the Dot 2, an IBM Personal

Computer-compatible machine that, despite its compatibility, flourished in a market already flooded with IBM clones.

Although he knew the company was headed for rocky times, Moore nevertheless decided to join Computer Devices as executive vice-president in August 1983.

While some would have steered clear of such circumstances, Moore said he was "intellectually hooked" and believed the company's basic business — manufacturing and selling portable terminal/printers — was a sound one. "By that time, the assignment had changed from managing explosive growth to seeing if I could turn around a difficult situation," he explained.

When 1983 ended, the company had reported a \$20 million operating loss, had slashed its work force from

more than 400 to 100 and shut down two of its three buildings. In addition, Computer Devices was plagued with a class action suit brought by shareholders who claimed they were defrauded when the company made an \$11 million public offering three months before its bankruptcy.

Moore said the New York court in which the class action suit was filed has agreed to dismiss the company from any liabilities. That action relieves the company from paying up to \$11 million in damages sought by the shareholders.

The shareholders' suit was followed in 1983 by a Securities and Exchange Commission (SEC) investigation into possible illegalities involving the stock offering. That investigation is continuing, Moore said. An SEC spokesman in Boston said that the agency does not comment on

such legal investigations.

The company's reorganization efforts have not only involved a sharp reduction in staff and facilities but also a renewed emphasis on its traditional business — a portable computer terminal/printer called the Miniterm 3000 series. More than 44,000 Miniterms have been sold since the product was introduced in 1980.

"What had happened was the [Computer Devices] management team had opted to build a personal computer business on top of this base business, and it failed," Moore said. "I did the obvious thing. I stripped it back down to the basic business that had been historically successful."

Moore acknowledged that the bankruptcy had had a negative effect on the company's sales to new customers. The General Services Administration, for example, denied Micro Devices a contract last year because the company was operating under Chapter 11.

Although the company is not yet out of the woods, it is making some strides. Last summer, it paid off about \$1 million in secured debt owed to the Bank of New England.

Moore said he was "intellectually hooked" and believed the company's basic business was a sound one.

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In addition, all the people who submitted winning entries will be thrown into a hat (at least their names will be) and six lucky winners will be drawn more or less at random (we never promised fair). These lucky people (or animals, as the case may be) will receive a \$75 gift certificate good at a selected computer store (probably the one that'll give us the biggest discount).

Remember that all entries become the property of CW Communications/Inc., and that the decision of the judges will be considered final. No representations as to the competence, skill or fairness of the judges are being made. All entries must be received at our offices in Framingham, MA, no later than March 1, 1985.

Yes,

I'd like to enter Computerworld's ridiculous button contest. I hope your judges can see. Here is my entry. (If you have more than one, please put them on separate forms).

COMPUTERWORLD
THE NEWSLETTER FOR THE COMPUTER COMMUNITY

Write your entry here:

Name _____

Company _____

Address _____

City _____ State _____ Zip _____

Phone: _____

Send to: Nancy Langmeyer, Marketing Services Department,
Box 880, Framingham, MA 01701.

POSITION ANNOUNCEMENTS

Why in the world would you want to work at Wang's new Regional Support Center?

For all the right reasons:

Wang, the acknowledged leader in computer-driven Office Automation, is building the premier customer support organization in the industry. At our Regional Software Support Centers in Dallas, Atlanta, and Boston, we're assembling a talented team of professionals who will be a part of an incredible environment.

These Centers will actually be sophisticated laboratories equipped with state-of-the-art technology to stimulate our customers' office environment. There, and in the field, we will seek software solutions in support of our technology in six key areas: Data Processing, Word Processing, Image Processing, Voice Processing, Networking and Human Factors.

Software Opportunities:

We are currently staffing at various levels for Software Analysts with the following general qualifications:

A BA in Computer Science or equivalent combination of education and experience with at least 1 year experience in software support is required. Skill in at least one level of a programming language is needed along with good verbal skills. Demonstrated troubleshooting ability including diagnosis of software anomalies, analysis of software problems and source codes is desired. Experience in telecommunications would be a definite plus.

These are just a part of the on-going opportunities at Wang's Regional Support Centers in Dallas, Atlanta and Boston.

We also have Staffed Software Support positions in major cities throughout the United States that provide local customer support. Please contact Mary Janella for these positions.

Wang offers one of the best benefit programs in the industry including profit sharing, stock bonus, long term stock option, stock purchase and incentive saving plans, company paid dental, medical and life insurance, tuition reimbursement and adoption assistance. Choose the location suited to your lifestyle and career ambitions, and send your resume to the appropriate address below.

Wang Laboratories
Dallas Regional Support Center
Attn: Bill Smith
545 E. Computer Parkway
Irving, TX 75039

Wang Laboratories
Central Regional Support Center
Attn: Kathy Smith
5555 Lake Park Drive, Suite 400
Brynmore, PA 19009

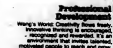
Wang Laboratories
Eastern Regional Support Center
Attn: Frank Whelan
15 Crosby Drive
Bedford, MA 01755

Wang Laboratories
U.S. Field Operations
Attn: Barry Jacobs
407 S. Union St., 5th Floor
South Lawrence, MA 01960



Growth

Today, Wang stands \$227 on the Fortune 500 with over \$2.3 billion in revenues. And projections are even brighter for Wang!



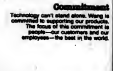
Professional Development

Wang's World Classify Area. Ready, innovative thinking is encouraged, recognized and rewarded in an environment that makes talented, motivated people to reach and grow.



Technology

Wang's technology is powerful, versatile and proven. Innovation that solves problems and meets needs is its strength. Supporting its key concepts, Wang accepts one position in technology—leadership.



Commitment

Technology can't stand alone. Wang is committed to supporting our products. The focus of this commitment is people—our customers and our employees—the best in the world.



Because the ^{new} world of office automation is taking shape with you at Wang!

We are an affirmative action employer.

WANG

We put people in front of computers.



**DALLAS
SUN BELT
NATIONWIDE**

Programmers, Analysts, Software Specialists: Let us assist you in your career advancement as we have hundreds of computer professionals like yourself since 1970.

In Dallas, our clientele consists of virtually every major data processing institution as well as numerous similar organizations. Nationally, through our network of 30 offices, we represent thousands of career opportunities across the entire U.S. Send us your professional resume or call us today.

dp DataPro
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CONSULTANTS
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DALLAS, TEXAS 75239 (214) 401-4000
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SYSTEMS
PROGRAMMER
ANALYSTS AND
PROGRAMMER
ANALYSTS
SUNBELT LOCATIONS**

Job description, compensation, and advancement are the major elements to evaluate in advance one's career goals. Every career opportunity calls us by phone. We will be in the market for you. Let us keep your resume on file. Advise us of any changes in your status. We will keep your resume on file. Advise us of any changes in your status. We will keep your resume on file. Advise us of any changes in your status.

Dunhill
OF CHARLOTTE, INC.
2001 Center Road, Suite 107
Charlotte, North Carolina 28205
(704) 485-2512
(704) 485-2512

**HP3000
ANALYST**

Prequalified research firm in major NY State medium profile or analyst, with HP3000 expert, min. 8 yrs. exp., & excellent interpersonal skills. Position req. significant work experience. A rapidly growing supply in beautiful living area near Albany, NY, \$36,000.

ROBERT MULL
OF BUFFALO, INC.
400 Main Street
1000 Living Building
Buffalo, NY 14203
215 Broadway
Buffalo, NY 14203

POSITION ANNOUNCEMENTS

Consumer Applications Engineers are currently seeking a talented Software Engineer to design and develop software for personal computers in the application of data, word processing, spreadsheets, operating systems, communications, database management systems and mathematical programming. The ideal candidate will be responsible for analyzing, designing, programming and testing software. The successful candidate will be responsible for analyzing, designing, programming and testing software. The successful candidate will be responsible for analyzing, designing, programming and testing software.

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MANUFACTURING AUTOMATION SOFTWARE!

PHOENIX AND LOS ANGELES

SEI develops data processing experts. We help smart and hardworking data processors evolve into nationally recognized authorities in a wide range of technical disciplines. SEI builds experience by having our consultants:

- Work alongside senior SEI staff members, including nationally recognized experts in Local Area Networks, Industrial Automation, and Robotics.
- Gain hands-on experience in large, sophisticated projects.
- Represent SEI on national technical committees, setting industry directions.

CAD \$35-\$80K to Start

SEI/Phoenix is seeking three ambitious software programmers (minimum 4 years experience), to help build one of the largest and most sophisticated internationally networked CAD support environments. Key qualifications include experience in VM/CMS applications, networking experience, and working knowledge of Unix* and C. BSSE+ a plus.

ATE \$35-\$50K to Start

SEI/Los Angeles is currently seeking four top notch programmers (minimum 4 years experience) to build leading edge computer controlled manufacturing test systems. Key qualifications include experience with Unix* or RSX-11M, work in a variety of languages (Pascal, C) and familiarity with hardware design and testing. SEI offers permanent positions, top salaries, excellent benefits, and unlimited opportunity for growth and development. For confidential consideration, send resume and salary history to:

SEI Information Technology
Attn: Albert L. Foster
315 East Thomas Road
Phoenix, Arizona 85012

SEI Information Technology
Attn: Kathleen Radner
5455 Wilshire Boulevard
Los Angeles, California 90036

SEI information technology

SEI is a member of AT&T Bell Laboratories

An Equal Opportunity Employer M/F

VAR - VAD IBM TURN KEY SALES

Opportunity to join young international distributor of IBM hardware systems. We are an eight year old manufacturer of multi-national software packages for the financial services industry. I.e., credit unions, collection agencies, property and casualty insurance and others. We are now seeking a salesperson to sell our IBM compatible software on the IBM compatible. We have a large IBM compatible software on the IBM compatible. We have a large IBM compatible software on the IBM compatible. We have a large IBM compatible software on the IBM compatible.

PROGRAMMER ANALYST

Meet New Career Challenge
In A Professional Environment

THE HUBBELL LIGHTING DIVISION is seeking a highly motivated individual to play a major role in the design, programming and implementation of business and manufacturing systems. These systems are being developed on a large IBM System 38, using RPG III. You will be part of a small, highly visible team of professionals, dedicated to providing the user with state-of-the-art computing tools. Your opinion is a valued input during the entire process.

A solid background in system design, programming and implementation, using the System 38 and RPG III is preferred. Candidates with other exceptional qualifications such as Data Base and Telecommunications will be considered. This position offers excellent growth opportunity and fringe benefits. Send resume and salary requirements in confidence to: Ms. Joyce A. Grover, Personnel Supervisor, Hubbell Lighting Division, 2600 Electric Way, Chelmsford, MA 01827.

An Equal Opportunity Employer M/F

HUBBELL

lighting division

NEW ENGLAND

From the Beverly Hills of Cape Cod to the Snowy Shores of Vermont, SEI COVER HIRE ENLARGERS The professionals from our 40+ nationally located offices will be in your area. We are currently seeking a Sales Representative to sell our IBM compatible software on the IBM compatible. We have a large IBM compatible software on the IBM compatible. We have a large IBM compatible software on the IBM compatible.

Pastor's Inc.

117 Park Avenue, Suite 301, West Springfield, MA 01095
or Call Outcall BILL MALLORY (415) 791-6415

DATA PROCESSING PROFESSIONALS

DATA RESOURCE CORPORATION, headquartered in Atlanta, is seeking individuals who desire to work in various stimulating Data Processing environments. SEI and DRC offers an excellent opportunity to work in a dynamic and progressive company that "grows people fast". DRC is an equal opportunity employer.

Counseling and Contract Programming throughout the Southeast for the area. DRC offers competitive salaries including bonuses and overtime pay. If you are seeking a growth opportunity with a dynamic and progressive company that "grows people fast", DRC is an equal opportunity employer. Send resume to: JOHN BUCKNER III, Suite 301, Atlanta, GA 30301 or call BUCKNER or JIM BARRETT at 404-455-7260 or toll free 1-800-544-4444.

DRC
INC.

Director of Data Processing

Predicta, a leading data base publisher located in Cleveland, Ohio, is seeking a Director of Data Processing. This position has total responsibility for all aspects of data processing including hardware/software selection, system design, programming, documentation, operations and data entry.

We are currently in the early phases of design for a completely new system to provide for a state-of-the-art data processing and production system. This system will utilize super mini-computer technology with personal computer work stations. Applications will be functionally distributed between host and work stations.

The successful candidate will have 8 years of data processing experience with at least 3 years in a management position; have experience with structured design/programming; have experience with super mini-computer and personal computer; be familiar with data base management systems and system conversions. You must have significant experience in test processing applications with a knowledge of bibliographic control and automatic thesaurus systems. A degree in computer science is desirable but not required.

This challenging assignment offers an excellent starting salary, a competitive benefits plan including a liberal relocation program. To be considered, send a resume which details your background and accomplishments and includes your salary history and salary requirements to:

Director of Employee Relations
Predicta, Inc.
11001 Cedar Avenue
Cleveland, OH 44108

An Equal Opportunity Employer M/F

THIRD OF YOUR LONG COLD WINTERS

Now you can escape the cold with the new SEI/Phoenix. We are currently seeking a Sales Representative to sell our IBM compatible software on the IBM compatible. We have a large IBM compatible software on the IBM compatible. We have a large IBM compatible software on the IBM compatible.

POSITION ANNOUNCEMENTS

COMPUTER SALES

We offer an exceptional base salary, commission, and benefits package for:

NATIONAL SALES MANAGER
• 5 years computer sales management experience

• Knowledge of healthcare industry
• 70% travel

SALARY REPRESENTATIVE
• 5 years process computer sales experience

• Knowledge of micro-computer and healthcare industry a plus
• 70% travel

• Location in Dallas (flexible)
This is a growth area opportunity for the person possessing computer or sales representative or manager. You won't get lost in the routine because you'll be a part of a growing company. For more information send your resume or call 901-726-0282.

Brands Technology Corporation Personnel Services

Methodist Health Systems
1709 Madison Ave.,
Suite 300

Memphis, TN 38104
MICROBASIC MEDICAL DATA SYSTEMS

A Subsidiary of Methodist Health Systems
An Equal Opportunity Employer M/F/H/V

MANAGEMENT

SENIOR
VICE-PRESIDENT
INFORMATION SYSTEMS

Southland Healthcare System is the second largest health care organization in the United States. We are currently seeking a Vice President of Information Systems to lead a team of 200+ staff in developing, implementing, and managing the information systems of the system. The position will be responsible for the overall direction and management of the information systems department. The position will be responsible for the overall direction and management of the information systems department. The position will be responsible for the overall direction and management of the information systems department.

• A generous compensation package is offered, including base salary and a significant bonus for meeting yearly objectives.
• The position offers a challenging and rewarding career opportunity for the individual who is motivated and committed to the success of the organization.
• The position offers a challenging and rewarding career opportunity for the individual who is motivated and committed to the success of the organization.

CEP-04887, Computerworld, Box 985,
Pittsburgh, PA 15211

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MICROPROCESSOR
PRODUCT EXPERTS!

BAY AREA AND CHICAGO

SEI means full-time, project-oriented, high technology consulting—meaningful participation in significant client projects that set the standard for technical innovation in new hardware and software products.

SEI seeks hard working, quick learning professionals who are serious about their careers and interested in the variety and challenge of consulting.

Communications Experts

\$45-\$80K to Start!

SEI/Bay Area is seeking two communications experts (minimum 6 years of solid experience) to participate in the development of new micro-based products. Key qualifications include experience with Unix, internals, LANs, X.25, SNA/LLU 6.2, and TCP/IP.

Micro Applications

\$30-\$45K to Start!

SEI/Chicago is seeking three smart, hard-working up-and-comers (minimum 3 years experience) to participate in Unix-based applications development for the Travel and Communications industry. Key qualifications include experience with Unix, C, Pascal, and 4th Generation Languages.

SEI offers permanent positions, top salaries, excellent benefits, and unlimited opportunity for growth and development. For confidential consideration, send resume and salary history to:

SEI Information Technology
Attn: Mary Larkin
177 Boveet Road
San Mateo, California 94402

SEI Information Technology
Attn: Michael Robinson
450 East Ohio Street
Chicago, Illinois 60611

SEI information technology

*Unix is a trademark of AT&T Bell Laboratories

An Equal Opportunity Employer M/F/H/V

EDP OPERATIONS
MANAGER
To Mid \$30's

Nashua Corporation needs a Computer Operations Manager for its corporate headquarters in Nashua, including the technical support group. The ideal candidate will have 5 or more years experience, at least 2 years at the manager level, and be thoroughly familiar with the designing, programming and maintenance of computer software in a VAX/VMS, DOS/VME, CICS, Power and JCL environment. Hardware consists of an IBM 4381, IBM S/38, Wang VS 100.

Candidates should forward resume to:
Irving Larkin, EDP Manager

**NASHUA
CORPORATION**
44 Franklin St.
NASHUA, N.H. 03061
An Equal Opportunity Employer M/F

PROGRAMMER/
ANALYST

At Systems, Inc. has established a new position of Programmer/Analyst. The primary responsibility will be to work with the systems analyst and management to analyze the needs of the client and to develop the program. The programmer will be responsible for the design, development, testing, and maintenance of the program. The programmer will be responsible for the design, development, testing, and maintenance of the program.

Qualifications for this position are a minimum of 3 years of experience with CICS, and a minimum of 2 years of experience with JCL, and a minimum of 2 years of experience with JCL, and a minimum of 2 years of experience with JCL.

If you are interested in accepting the offer, please send your resume and salary history to:

Barbara E. Tucker
JENNIFER HOSPITAL
217 E. Chestnut
Lansdale, PA 19080
An Equal Opportunity Employer

Systems
Programmers

Discover new technological
challenge in an advanced
EDP environment

When Aramco Services Company in Houston hires you as a Systems Programmer, you'll be working in support of ARAMCO—the largest oil-producing company in the world.

We are currently running MVS/ESA on a 308K and 3084K with JES2 MVS. We have a large production MVS/ESA system, JES2/VS, and TSO user base. Excellent opportunities are now available for qualified Systems Programmers in CICS and in program products, installation and maintenance.

Positions are open for:

CICS Systems Programmer must have current knowledge of CICS installation, maintenance, and debugging large file MVS/ESA installations. MVS/ESA and JCL experience would be beneficial.

IBM MVS/ESA Mainframe Program Product Specialist will be involved with a variety of operating systems, and must have knowledge of Focus, Teacraft, SAS, Pariview, TMS and complete 3-5 years of IBM systems programming experience required.

All positions require a college degree in Computer Science or related field, 3-5 years experience.

Foreign assignments available.

Team up with ABC talent and technology. We offer an extensive benefits program including medical/dental coverage, savings plan with company participation, continuing education program, a company cafeteria and more. To find out more, please send your resume to: Chip Smith, Aramco Services Company B-039-5, P.O. Box 4631, Houston, TX 77202.

ARAMCO
SERVICES COMPANY

MANAGER TECHNICAL SERVICES

Medline Systems Corporation, a leader in the development of Healthcare Software, is seeking highly motivated individuals who are qualified to support and maintain a systems programming staff in an IBM CICS/OLI environment. Some career opportunities are available at various facility management sites throughout the United States for individuals prepared to manage a technical support function in a large IBM mainframe environment. Qualified candidates should send resume to: Chip Smith, Aramco Services Company B-039-5, P.O. Box 4631, Houston, TX 77202.

In addition to challenge, visibility and potential for growth, Medline offers an excellent salary/benefits package including 100% tuition reimbursement. Some career opportunities are available at various facility management sites throughout the United States for individuals prepared to manage a technical support function in a large IBM mainframe environment. Qualified candidates should send resume to: Chip Smith, Aramco Services Company B-039-5, P.O. Box 4631, Houston, TX 77202.

UNIX*/C

\$25,000 to \$50,000
APPLICATIONS & SYSTEMS

National Placement Leader
For UNIX*/C
500 CROWN HILL DRIVE
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C/O J. ROGERS ASSOC

131 Pasadena Center Rd. Suite C-9
Lombard, IL 60148
*UNIX is a trademark of Bell Labs

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Data Processing

These Ad Pages Offer Many Ordinary EDP Opportunities.

Arthur Young Management Consulting Offers...

...Extraordinary Career Opportunities.

There are many reasons why our Systems Group has more than quadrupled over the last two years.

The following are but a few...

- Personal Involvement With Clients
- Rapid, Stable Growth
- Interesting & Challenging Assignments
- Unparalleled Career Opportunities
- New Systems Development
- An Exciting Work Atmosphere
- Ongoing Career Development
- Encouragement of Innovation
- Individual Recognition
- Prestige

Call Jim McCormick at your convenience or send us your resume. We'll give you good reasons why career opportunities at Arthur Young are anything but ordinary.

An Equal Opportunity Employer M/F

A MEMBER OF ARTHUR YOUNG INTERNATIONAL
ARTHUR YOUNG
Let's Build Systems Together

James T. McCormick
 One 604 North 33rd Road
 Chicago, IL 60611
 (312) 645-3035

We take business personally.

COMPUTER PROFESSIONALS

Have You Considered West Virginia?

The National Radio Astronomy Observatory has a permanent position available at the Green Bank, West Virginia facility. Green Bank is a small community nestled in the Allegheny Mountains, near Shenandoah National Park. Here you have stimulating professional challenge in an academic-type environment, supported by a caring country lifestyle. The Observatory is seeking a handful of astronomers from all parts of the world. We invite you to join us as a:

SYSTEMS PROGRAMMER

With extensive background in real-time data acquisition, signal processing, and instrument control. Responsibility involves the development/maintenance of on-line telescope systems, working closely with a technical support group. Existing and planned assignments include: 48000-based supercomputer comparison, broadcast project to facilitate telescope control and development of a unique processor for high frequency and time resolution. Development of a software package to analyze astronomical data off-line will precede in parallel. Knowledge of or ability to learn UNIX, C, and Fortran is essential. Astronomical experience desirable but not necessary.

For consideration send your resume to:

Personal Manager

NATIONAL RADIO ASTRONOMY OBSERVATORY

Edgemont Road, Charlottesville, Virginia 22901

An equal opportunity employer M/F



NEW ENGLAND

CAPACITY PLANNING	\$45,000
ADMINISTRATIVE TOTAL	\$42,000
PROJ. MGR. - PORTMAN	\$40,000
BUS. & CONSULTANT	\$40,000
MR. M. V. T.	\$38,000
INVESTMENT SYS.	\$35,000
REP. SYS. - 30/30/24	\$33,000
NETAL. SYSTEMS	\$32,000
EDP. ANALYST	\$32,000
CORPORATE PORTMAN	\$27,000

LEAHY & COMPANY

200 South Street, Suite 201
 Boston, Mass. 02110
 Telephone (617) 452-4468
 Personnel Consultants

DATA PROCESSING PROFESSIONALS

The Federal Center of Control Services (FCCS) is seeking experienced data processing professionals to assist in the following continuing assignments:

Software Manager (Systems programming, system analysis, technical project case studies)

Programmer Analyst

Our applicants are primarily COBOL, an on-line C/C++ under OS/VS and IBM/VS systems, and IBM/VS systems. The data processing systems are primarily IBM/VS systems.

The Federal Center of Control Services is an equal opportunity employer. To learn more about these opportunities send your resume to:

Medical Center of Control Services
 P.O. Box 1000, Springfield, Mass. 01103

SRL CONFIGURATION

PLANNING SPECIALIST

Manage Scientific Computing Equipment Configuration - SOHO



Scientific Systems is a major division of BOMBA Cleveland Data Center. As a predominantly CDC environment, we deliver state-of-the-art computing capabilities to our large scientific user community.

This position requires a PhD or MS in Computer Science, Physical Science, Math or Engineering, plus 5 years' data processing or telecommunications project management experience. Knowledge of Control Data Computing Systems is also important.

In this position, your key responsibility will be managing the configuration of scientific equipment, including the Cyber 205 data network. Other typical responsibilities include:

- Evaluating the suitability for Soho, of newly released CDC and Cyber-compatible hardware
- Collecting and coordinating relevant vendor information
- Developing, reviewing and approving comprehensive quarterly configuration plans
- Coordinating all new equipment installation activities
- Supervising the development, maintenance and updating of an equipment inventory and order tracking system
- Identifying Cyber configuration modifications that promptly and cost effectively remedy problems that affect level of service
- Maintaining state-of-the-art computer performance proficiency and hardware capability

We offer an attractive total compensation plan and generous benefits. BOMBA's comprehensive relocation package for new hires includes all moving expenses. Management also provides for marriage interest differential allowances, third-party home purchase and other features typically restricted to internal transfers.

Start now, by sending your resume, detailing your related educational background, career experience and abilities, in strict confidence to:

Jan D. Hellick, Senior Executive Recruiter
THE STANDARD OIL COMPANY (SOHIO)
 404 Midland Building - 7800 - Cleveland, Ohio 44115

An Equal Opportunity Employer

"Help us Help to Assure America's Energy Future"



ARCHITECTURAL PLANNER

At GTE Data Services, we've blended a team approach with an entrepreneurial spirit to reach new heights in customer-focused technology.

We are in need of an Architectural Planner to define and lead the establishment of an architecture for integrated telecommunications, DP and other product networks. Requirements include:

- Minimum of 18 years experience in telecommunications, DP, large networks and office automation
- Knowledge of network theory, data-base techniques, PABX's and local transport communications
- Excellent management and project leadership skills
- PhD in Engineering, Computer Science, Math or equivalent

GTE Data Services, a subsidiary of GTE dedicated to Information Management, offers the challenge of a lifetime, the rewards you deserve and relocation assistance to our Florida Gulf Coast location.

Please submit resume with salary history to: R. Fitzmaurice, Dept. CWD, GTE Data Services, P.O. Box 1546, Ocklawaha, Florida 32861. An equal opportunity employer.

GTE Data Services

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Some Of The Most Important Careers In America

At Computer Sciences Corporation, our Defense Systems Division has been concerned with issues vital to our country's future for over 25 years. We also care about the things that are important to you. Your career—your family—your future. And we are always seeking new ways and new talent to further our growth through advanced communication systems technology.

We're doing important work at the Defense Systems Division. Join us and take on today's urgent defense challenges. Work with the industry's most advanced resources in a stimulating atmosphere. Immerse yourself in such vital projects as: ABGCS Weapons Systems, Military Communications, Enhanced Naval Weapons, and other related programs that utilize the most up-to-the-minute computer software, advanced graphics workstations, office automation software, prototype hardware and simulation for testable weapons, including P-3C.

If you're ready for an important career step, find out more about us by contacting the Staffing Department, Computer Sciences Corporation, Defense Systems Division, P.O. Box N, CW-2225, Moorestown, NJ 08057.

CSC

COMPUTER SCIENCES CORPORATION

Mountain, NJ • Berkeley, CA • Boca Raton, FL • Boston, MA • Dallas, TX • Denver, CO • El Segundo, CA • Ft. Worth, TX • Houston, TX • Irvine, CA • Jacksonville, FL • Los Angeles, CA • Miami, FL • New York, NY • San Diego, CA • Seattle, WA • Springfield, MA • Tampa, FL • Washington, DC • Wichita, KS

SR. PROGRAMMER ANALYST (San Diego)

J.C. Schumacher Company is a rapidly expanding supplier of ultra-pure materials and electrical controls to the Semiconductor Industry. We have an immediate need for a person with an A.A. Degree or equivalent in data processing and 3-5 years programming/analysis experience in a manufacturing environment. MAPICS and System 36 experience preferred.

Responsibilities include system analysis of manufacturing systems, application design for support of manufacturing, programming in RPG II and O.C.L., program maintenance, and supervising programming staff.

We offer an attractive salary, complete benefits package, and a prime location in No. San Diego County near beaches and metro areas. If you meet our qualifications, please send resume to Joe Quince, Human Resources Manager, or phone (619) 433-1663.



J. C. Schumacher Company
P.O. Box 1158
Oceanside, CA 92054

An Equal Opportunity Employer



COMPUTERWORLD

Can Point
You In The
Right
Direction

Find the job you want in Computerworld's classifieds. No other publication carries as many ads for computer professionals as Computerworld, so no other publication can give you as wide a choice of jobs, salary and location as Computerworld.



WTS is the largest and most ambitious information system ever envisioned. And our Software, R&D facility is the worldwide focus for WTS information and software technology. WTS will bring unprecedented, continuously evolving technical capabilities to WTS/WACSS, the Worldwide Military Command and Control System and will provide new architectures, based on a foundation of local area networks tied into a number of permanent and transportable also worldwide. Our approach is unique. Rather than make the whole picture first and then slowly lock everything into technology as they currently exist, we're going to lay out the basic system architecture, then apply new capabilities in a series of enhancements designed to capitalize on the newest technologies as they emerge.

WTS is the future. Now and for many years to come. And our Billerica facility, located just 30 minutes North of Boston, is the ideal environment for your expertise to work while you enjoy the unmatched cultural, educational and recreational advantages of New England.

SOFTWARE ENGINEERING MANAGER

Software is the key to the success of WTS, and this critical management position will play an important role in ensuring the development of high quality software products. Major responsibilities include both technical and personnel management. You will perform all facets of planning and staffing the department including recruiting, training and development, appraisal, plus design and development, and testing the effectiveness of software development groups within the software development process from design through testing and deployment. You must have a B.S. or M.S. in CS, plus a minimum of 7 years of proven experience with accepted software methodologies, tools, and languages. Past management experience on DoD software development projects is highly desirable.

If interested and qualified, please forward a resume, in confidence, to Richard M. Schmitt, WTS Government Systems, Strategic Systems Division, 1 Federal Street, Billerica, MA 01821. An equal opportunity employer m/f/v. U.S. Citizenship required.



Government
Systems

INTERACTIVE COMPUTER SYSTEMS PLANNING EXECUTIVE

The leading performance improvement, communications and training organization has an exciting opportunity for an experienced Planning Executive to organize, plan and develop programs for computer-based and interactive video training and communication services to major automotive clients.

The ideal candidate will have experience in computer systems analysis, strong proposal and specification writing skills, experience/knowledge of car and truck merchandising, sales training, dealer systems and retail car/truck customer needs.

This is an opportunity which should be pursued only by those with high achievement needs.

Please send your resume and salary history to:

Human Resources-PECT
P.O. Box 7073
Bloomfield Hills, MI 48302-7073

Equal Opportunity Employer

The Amdahl Phenomenon

amdaahl

Price-performance of all large-scale computing rose 800% between 1975, when Amdahl introduced its first 470 mainframe computer, and 1982 when our latest 580 series emerged. We call that the Amdahl phenomenon, the result of a brilliant technology. The drive for greater

power in smaller packages continues at Amdahl. Now, as a total systems supplier, we're proposing a second decade growth rate double that of our technology, both in hardware and software.

Corporate Computer Center

When you join Amdahl's progressive Corporate Computer Center in Sunnyvale, California, you will enjoy these advantages reserved for the most select team in large-scale systems:

- Leading-edge software including MVS/DA, ACFINCF, ACFTIAM and MSNF, IMS/DB/OC, VMSP, UTS.
- A hardware configuration that consists of one 5870, four 5860s, four 470VAs, six 4705s, mass storage system, over 700 spindles of DASD and over 4,000 terminals.

Product Development

Amdahl continues to expand performance and productivity with forward-looking products for customers dealing with large-scale data processing.

Sr. Systems Programmers

Participate in the design, development and testing of current and future products. May assume responsibility for source control systems. Requires 5 plus years in support or development of 370 operating systems. Assembly language coding experience mandatory. Experience with VM/SP systems desirable.

Sr. VM Systems Programmer

We are seeking a Sr. Systems Programmer to support VM/SP and related software. If you have a minimum of 4 years VM systems programming experience, including installation, maintenance, VM internets, and strong diagnostic skills, plus experience in Assembly language coding, you may qualify for this position.

Staff MVS Systems Programmer

Perform problem determination, installation and maintenance activities for a JES2 MVS operating system as well as propose and implement state-of-the-art software enhancements to improve service and productivity. Provide technical leadership in software-related projects and planning efforts in the Corporate Computer Center. 7 years MVS systems programming experience with in-depth knowledge of at least one major subsystem and strong diagnostic skills may qualify for this position.

Staff Systems Programmers

Responsible for implementing enhancements to a highly modified VM operating system which will be used to simulate future products. This position could also involve building a new simulator. Requires 5 plus years VM experience to include internets, internets, and maintenance. Assembly language coding experience mandatory.

Staff Systems Programmer

Play a major role in a key development project, including development of Multiple Domain Facility and related functions for future products. Requires 8 plus years experience in systems development with in-depth knowledge of 370 architecture.

Staff Systems Programmers

Participate in the design, development and testing of a key development project. Assume responsibility for testing codes for 370 and XA mode recovery. Design and implement recovery enhancements for future products. We require 5 plus years experience with IBM 370 Architecture. Assembly language, thorough knowledge of MVS Recovery, channel and machine check handling.

Development Manager —

Future Products
Participate in requirements definition, and be responsible for the development and implementation of future Amdahl products. Knowledge of 370 architecture a must, experience with VM and MVS is desirable.

Peripheral Products Division

Amdahl's Peripheral Products Division has attained unprecedented growth during its short existence. Market response to our 8600 Series Storage Systems reflects the significant advances in performance, reliability and user economics Amdahl customers have come to expect. Here is an opportunity to work in a small development group with leading Japanese design teams on advanced storage control products. Positions are available in Sunnyvale, CA and temporary assignments in Japan.

Sr. Storage Control Unit Design Engineers

Responsible for detailed design on an Advanced Storage Control Unit. Hardware logic design position.

Software Instructors

HOUSTON, TEXAS (P.O. Box 100)

Amdahl's educational curriculum has played an important role in our growth. "Amdahl-U" provides an extensive curriculum of courses, programs and seminars covering large-scale central site operations.

cycles for CMOS technology will be used in conjunction with a supporting design automation system. Position also requires writing appropriate portions of technical design documents. Requires 5 plus years of design-related experience using digital design techniques. Project leader position available.

Sr. Microprocessor/Microcode Design Engineer

Responsible for detail design and programming of a central microprocessor within an Advanced Storage Control Unit. Requires 5 plus years of design-related experience using micro-programming techniques for microprocessor controlled hardware units.

Software Instructors

Develop courses for 580 software in MVS, VM, TP, and IMS. You'll be responsible for both lecture and lab. Requires a minimum of 8 years in quality experience; strong operating systems knowledge in VM or MVS; and good leadership skills. Training experience desirable but not mandatory.

Staff Systems Programmer

Generate and maintain MVS system software to support Amdahl's storage products. Develop MVS based software to enhance the products and ensure compatibility. Work with hardware development engineers to develop stress test cases to be used for Amdahl's storage product line. Requires 5 plus years experience with MVS internets, and an in-depth knowledge of I/O operations.

To explore one of the opportunities in the Corporate Computer Center, The Peripheral Products Division or Product Development, contact Rita Hewlett, Tel: 714/352-3448, extension 8198. In California, call COLLECT at 714/352-3448.

To explore this opportunity contact Rita Tyler, TOLL FREE 800/528-6428, extension 8198. In California, call COLLECT at 408/740-8198. Or send your resume to Rita or Bob at Amdahl Corporation, Dept. 12-998, MS-395, P.O. Box 2476, Sunnyvale, CA 94089-3476. We are an equal opportunity employer through affirmative action.

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NATIONAL UNIVERSITY OF SINGAPORE DEPARTMENT OF INFORMATION SYSTEMS AND COMPUTER SCIENCE

AN INVITATION TO ESTABLISHED ACADEMICIANS AND SUCCESSFUL PROFESSIONALS IN COMPUTER AND INFORMATION TECHNOLOGY

THE POSITIONS

Applications are invited for teaching appointments in the Department of Information Systems and Computer Science. Candidates should have a PhD degree and at least a Master's degree in Information Systems, Computer Science, Computer Engineering or Business Administration together with relevant experience.

THE DEPARTMENT

The Department, which has an annual output of 300 graduates, offers courses leading to a BSc degree, a BSc (Honours) degree and MSc degree. Since 1973, it has produced 400 graduates in Computer Science. Based on the curriculum recommendations of ACM, IEEE, ICAI and substantial input from the local computer industry, the undergraduate curriculum provides for five major strands of study: Information Systems and Systems Science.

Computing facilities include the Department's own VAX-11/780 and business micro-computer systems. There are plans to at least triple the total CPU power. In addition, the Department is a major user of the Cray-1, 16 vector, 32M 386/1024 mainframe computer system of the University's Computer Centre. The staff of each course and staff of the Department's Computer Centre. The staff of each course and staff of the Department's Computer Centre. The staff of each course and staff of the Department's Computer Centre.

THE UNIVERSITY

The University is highly regarded as one of the best in Asia. It presently has a student body of over 12,000 and an academic strength of 1,200.

Progress is shown as a commercial, financial, industrial and communication centre in South East Asia. Vigorous economic growth patterns, and it has the second highest per capita income in Asia after Japan. It has been aggressively developing its technology and industry. The University has been aggressively developing its technology and industry. The University has been aggressively developing its technology and industry.

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Lecturer	\$8,400 - \$12,570
Senior Lecturer	\$12,570 - \$17,140
Associate Professor	\$17,140 - \$22,710
Professor	\$22,710 - \$28,280

(MS1 - MS2.25 approximately)

The outstanding salary will depend on the candidate's qualifications, experience and the field of appointment offered.

Lates and medical benefits are provided. Under the University's Academic Staff Provident Fund Scheme, the staff member and the University are each required to contribute at the present rate of 2% of the salary. The contribution of the staff member and the University being subject to a maximum of \$81,250 per month and \$81,750 per month respectively. The sum standing to the staff member's credit in the Fund is tax-free and may be withdrawn when the staff member leaves Singapore indefinitely permanently.

Depending on the type of contract offered, other benefits may include: a salary in arrears of \$81,250 (largest) or \$81,250 (smallest), additional housing allowance ranging from \$2,320 to \$2,320 p.m. for a family of up to three children, subject to a maximum of \$81,000 per annum per child, mortgage assistance and housing allowance for the transportation of personal effects to Singapore. Staff members may undertake consultation work, subject to the approval of the University, and receive an allowance of up to a maximum of 80% of gross annual emoluments in any one year.

Applications forms and further information on terms and conditions of service may be obtained from:

The Director
Personnel Department
National University of Singapore
Kent Ridge
Singapore 1111

Mr. Peter Lim
Director, South America Office
National University of Singapore
Suite 41, One Holland Road
91 West Hill Road
New York, N.Y. 10018
U.S.A.

BOISE, IDAHO SENIOR SYSTEMS PROGRAMMER

This position will be responsible for the MVS operating systems planning, installation and maintenance. Qualified candidates must have prior experience in COBOL or PL/I or BASIC programming. The MVS Systems Programmer also requires a sound, practical knowledge of the MVS operating systems, including MVS Internal, job control language, utilities and standard supporting software products, such as JES2, Devnet Support Facilities and STAMPS, etc. Excellent team environment. Competitive salary and benefits program. Relocation assistance provided.

Applicants should send resumes, with salary requirements, in complete confidence to:

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PROGRAMMER/ANALYST—To design logic, code, test and debug programs, you must have 3+ years programming experience including COBOL, CICS and MVS.

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Ayerst Laboratories Inc., a major pharmaceutical division of a Fortune 100 company, is seeking a financial systems analyst for its Rouses Point Data Processing Department.

The successful candidate will possess a Bachelors degree and 3-5 years relevant experience.

The person will be responsible for project leadership, systems analysis, design and implementation in our manufacturing facility. Experience in financial systems is a plus. The position requires excellent project management and communication skills, as well as a commitment to meeting targets and schedules.

Experience in IBM mainframe plus exposure to D/I or a similar database systems is necessary. DMS and screen design experience is preferred.

We offer a competitive starting salary with a full line of benefits including dental and prescription plans relocation and travel expenses.

Our facility is located in the scenic Adirondack Mountain/Lake Champlain region of New York State, a short distance from Montreal and the Lake Placid Olympic area.

Please send resume and salary history with requirements to:

Gary D. Wagoner
Personnel Manager

Ayerst

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"When it comes to recruitment advertising for top-notch data processing professionals, there is no other publication. In the past we have tried several competitive publications. As far as my clients and I are concerned, it is job hunting, they go straight to Computerworld."

That's why over 4,000 organizations ran more than 8,500 recruitment ads in Computerworld in 1984. The openings they advertised for cover the whole gamut of MIS/DP positions—including systems analysts, computer science & software engineers, directors of MIS/DP, programmers, systems managers, and systems managers. As a matter of fact, recruitment advertising has made Computerworld the national leader in classified advertising among specialized business publications (according to Business Marketing magazine).

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We're looking for talented software and computer engineers with a BS or MS and technical experience in minicomputer and microprocessor systems used in the development of software for real-time equipment control. Assignments may involve design of software systems for products or manufacturing control; programming mini- and/or microcomputers; integrating computer software and hardware into complex electromechanical systems; and quality assurance of computer programs.

Kodak also has opportunities for electrical engineers in the areas of design and development, video, test, systems and optical engineering.

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Exceptional business growth has created a need for the following major systems:

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Development of a major on-line order processing system to support the unique requirements of Princeton House, Inc. Project scope will include all functions from receipt of an order to customer shipment.

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Development of a manufacturing business support system to service on-site manufacturing and corporate facilities. The system will be integrated with the new order processing system and existing applications.

CUSTOMIZED APPLICATIONS

Development and support of customized in-house applications. Unique marketing strategies of Princeton House are supported by specialized systems requiring technical and functional enhancement and growth.

Submit resume to:

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A Colgate-Palmolive Company
435 Somerset Avenue
N. Dighton, MA 01914

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Our growth requires the addition of M.I.S. professionals to assume the following responsibilities:

PROJECT LEADERS

Lead major projects through all phases of the systems development life cycle. A BS/BA or equivalent and 4-7 years of M.I.S. experience is required. Proven skills must include project management and effective communications.

SYSTEM ANALYSTS

Perform extensive systems analysis and design while working with the users to translate business needs into system requirements. A BS/BA or equivalent and 3-4 years of M.I.S. experience is required. Proven skills must include systems analysis and design effective communications.

SR. PROGRAMMER ANALYSTS

Plan, design, program and implement complex system enhancements and new applications. An AS/BS/BA or equivalent and 1-1.5 years of IBM Systems 14 experience is required. Level is dependent on education, experience and the strength of technical, analytical and professional skills.

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PROGRAMMER ANALYST — INFORMATION MODELS

Position requirements include an MS in Computer Science or an MBA in Information Systems, 5+ years' proven systems experience, structured analysis and design, data base design, and proven supervisory capabilities. Prior experience with Cyber Resource Management Systems, especially for billing purposes, desirable.

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Department of Planning
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